Konelab Service Manual

www.thermo.com/konelab

Thermo
ELECTRON CORPORATION

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Preface

This manual gives technical information about Konelab 20, Konelab 30 and Konelab 60 analyzers and explains how to maintain and adjust them.

Audience

This manual is intended for personnel who service Konelab analyzers.

Scope

This Manual is divided into the following sections.

The CE mark attached on Konelab indicates the conformity with the EMC (electromagnetic compatibility) directive 89/336/EC.

Information in this manual is subject to change without prior notice.

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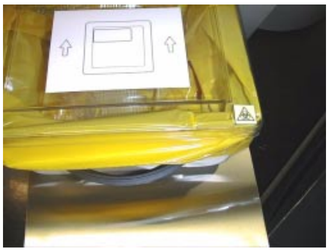
Warnings and Recommendations

Warnings in the Instrument

1		**WARNING:** Follow the instructions to ensure correct and safe operation.Do not open the cover when analysing is going on, because moving dispensers and mixer cause biohazard if hitting you by accident.
2		**BIOHAZARD:** All dispensers, mixers and washing stations are potential sources of infectious agents. Do not put your hand inside the analyzer when dispensers and mixers are moving. When cleaning them, be cautious and always use gloves.
3		**BIOHAZARD:** The Kusti dispenser is a potential source of infectious agents. Do not put your hand to the area where Kusti dispenser is moving.

4



BIOHAZARD:
The cuvette waste box is a potential source of infectious agents. Be cautious and always use gloves and protective clothes when handling it.

5

BIOHAZARD:
The waste water canister is a potential source of infectious agents. Be cautious and always use gloves and protective clothes when handling it.

6

WARNING:
The low current switch, found in Konelab and KUSTI models, does not turn power totally off. The low current switch has two settings:

- The analyzer has power on, when the lo current switch is ON (I), and at the same time the main power switch, in the back of the analyzer, is on.
- When the low current switch is in the stand by setting (⏻), only the boards of analyser and the internal PC are power off. To turn the power totally off, turn the main power switch, in the back of the analyser, off. If you cannot reach the main power switch, unplug the mains cable.
- If you take the mains cable off when the low current switch is on, the back-up batteries of the instrument are turned on.

You can boot the internal PC by turning the low current switch in the stand by setting and waiting at least one minute before turning it on.

7

WARNING:
The lamp house can be hot.

PINCH HAZARD!

Be careful with heavy parts of Konelab instrument when servicing and adjusting it.

Recommendations for the Instrument

It is highly recommended that the workstation PC is equipped with UPS (= uninterruptible power system) to avoid problems after power failure between PC's XP operating system and database management software.

Section 1 General

Konelab, the selective chemistry analyzer for in vitro diagnostic purposes is an integrated system solution for convenient and automatic testing of routine clinical chemistry tests, electrolytes and special chemistries, such as specific proteins, TDM, DoA and toxicology tests.

The Konelab family consists of six models:

- Konelab 60 which throughput is up to 600 photometric tests per hour.
- Konelab 60i has the ISE unit, which raises the throughput up to 780 tests/hour.
- Konelab 30 which throughput is up to 300 photometric tests per hour.
- Konelab 30i has the ISE unit, which raises the throughput up to 480 tests/hour.
- Konelab 20 which throughput is up to 200 photometric tests per hour.
- Konelab 20i has the ISE unit, which raises the throughput up to 380 tests/hour.

The ISE unit combines the direct measurement of Na^+, K^+ and Cl^- electrolytes with a sample volume as low as 50 µl. Li^+, Ca^{2+} and pH are offered as option for Konelab 60 and 30, Li^+ for Konelab 20.

Konelab 60 and 30 can be connected to the laboratory automation for direct sample dispensing from the conveyor to the analyzer.

The instrument workstation has fully graphical user-interface software. The software provides reliable control over the analyzing process and gives easy access to advanced functions.

1.1 Main Parts of the Analyzer

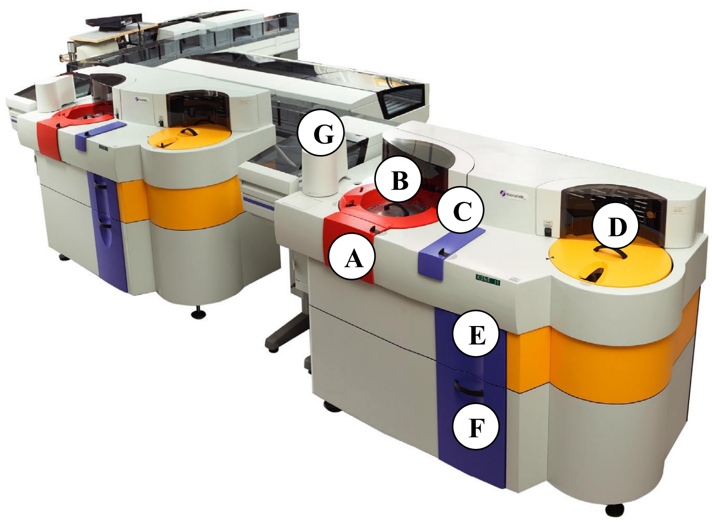
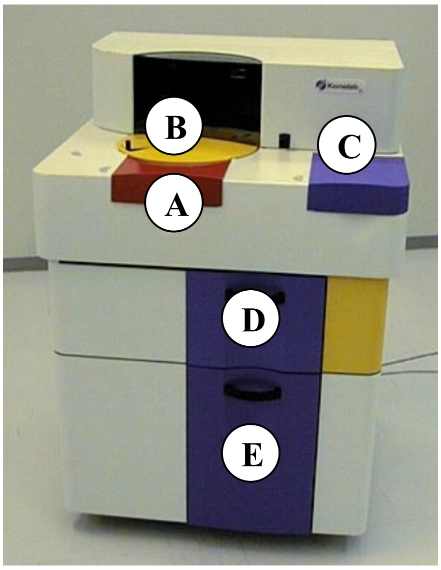


Figure 1-1 Konelab, the selective chemistry analyzer for in vitro diagnostic purposes

A. Segment loader	E. Cuvette waste compartment
B. Sample disk	F. Wastewater and distilled water containers
C. Cuvette loader	G. Optional interface for the automated sample transport line, so called KUSTI module
D. Reagent disk	



A. Segment/ STAT sample loader
B. Reagent disk
C. Cuvette loader
D. Cuvette waste compartment
E. Wastewater and distilled water containers

Figure 1-2 Konelab 20, the selective chemistry analyzer for in vitro diagnostic purposes

1.2 Samples

Samples are inserted in a 14 positions sample segment. Continuous processing is made possible by the use of independent bar-coded sample segments, which the user can insert or remove during analysis to enable loading and unloading of samples. After loading the segment, samples are immediately identified by direct barcode reading and cup type recognition. Six segments can be in the sample disk at the same time. For the STAT samples there are dedicated positions between the segments, 5 positions in Konelab 20 and 6 positions in Konelab 30 and 60.

Standard segment holds 5 and 7 ml primary tubes as well as 0.5 and 2 ml sample cups. A special segment for 10 ml tubes is available. The data can be given and results reported according to a patient or according to a sample. In addition the data can be entered during analysis.

Figure 1-3 A sample segment

Figure 1-4 A KUSTI segment available to Konelab 30 and 60

1.2.1 Konelab 20

Calibrators and controls are introduced as normal samples into a segment or into STAT positions. One STAT sample position is reserved for the ISE prime sample.

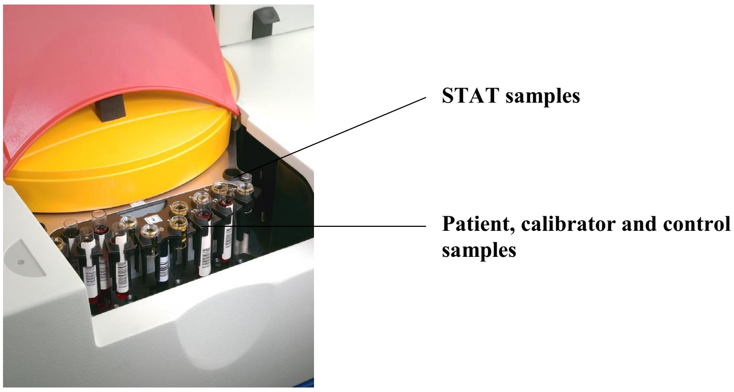


Figure 1-5 The sample disk of Konelab 20

1.2.2 Konelab 30 and 60

Calibrator, control and ISE prime samples have 40 fixed cooled positions in the middle of the sample disk. The positions are marked from S0 to S19, from C1 to C19 and ISE PRIME. Calibrators and controls can also be without fixed positions. In that case they are introduced as normal samples into a segment or into STAT positions.

In case automated sample transport is used, the analyzer is equipped with the optional KUSTI module and samples are dispensed to a disposable 92 positions segment. Further analysis of the sample from the KUSTI segment is continued in a normal manner according to the analysis requested. Simultaneous manual sample operation, e.g. for STAT and special samples, is possible.

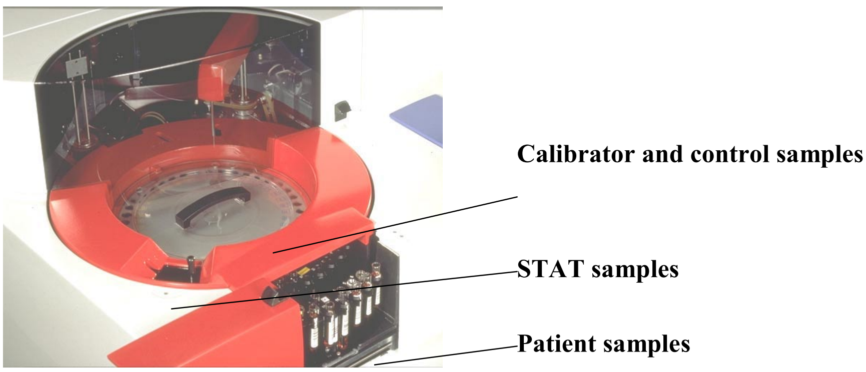


Figure 1-6 The sample disk of Konelab 30 and 60

1.3 Reagents

The analyzer has a cooled reagent disk for 60 ml vessels, 20 ml and 10 ml bottles. The reagent disk of Konelab 30 and 60 includes integrated barcode reader, in Konelab 20 the barcode reader for reagents is external. The data for the reagents without a barcode has to be entered in the REAGENT DEFINITION window. Dilution as well as buffer solutions are placed in the reagent disk.

Figure 1-7 Reagent vials and the 35-position reagent disk in the Konelab 20.

Figure 1-8 Reagent vials and the 45-position reagent disk in the Konelab 30 and 60.

1.4 Cuvettes

Samples and reagents are dispensed into a cell of multicell cuvette. One multicell cuvette has 12 cells.

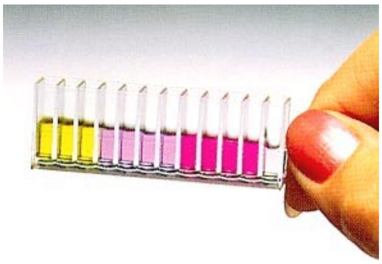


Figure 1-9 A multicell cuvette

WARNING!

The quality of results is guaranteed only with new cuvettes.

Do not reuse the cuvettes.

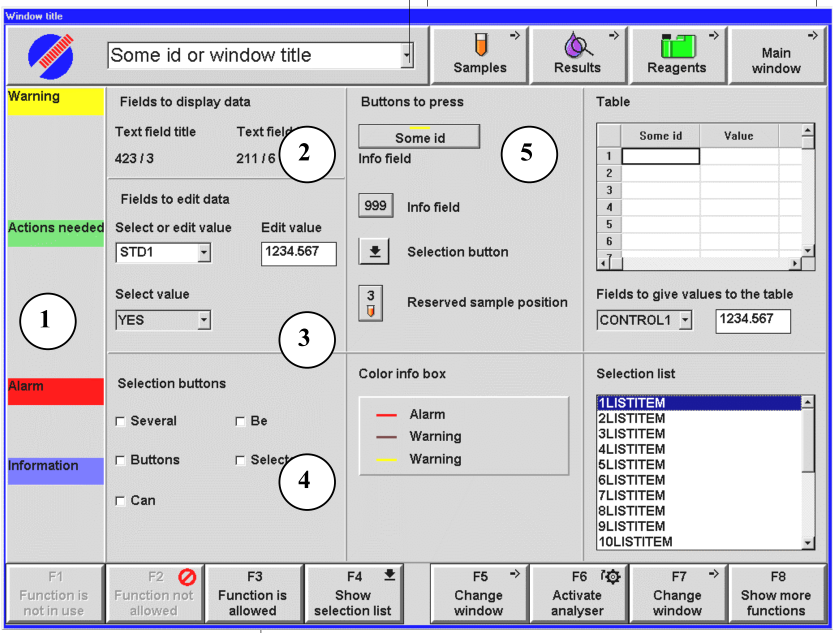
1.5 Graphical User Interface

1.5.1 General Features

Note: This window is only for instructions, you cannot find it in the software.

You can open the list of the window items, e.g. tests, samples, reagents (same as F4).

These buttons are in every window.



All active functions have a black text. The function is activated by clicking with the mouse left button over the button in the window or by pressing the function key (F1 - F12) on the keyboard.
Functions, which cannot be used, are shown grey.

1 Coloured labels:

• Yellow:	Warning, e.g., the volume of reagent is below the alarm limit.
• Green:	User actions are needed, e.g., results are waiting for acceptance.
• Red:	Alarm, e.g., the cuvette loader is empty.
• Blue:	Information, e.g., the analyzer's status.

2 Fields to display data: This data cannot be edited.

3 Fields to edit data: Type the value to the field or select the value from the list.

4 Group of buttons: Select several items.

5 Buttons to press: Click the button to open the window for further actions. The coloured line gives an additional information, e.g.,segment button with a green line means that the segment has been analyzed. Clicking the button opens the sample segment window.

Moving in the window from the field to another:

To move from the field to another :

- click the left mouse button:
- or press enter
- or tabulator

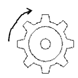
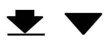
To move backwards press:

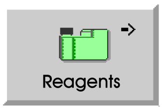
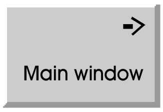
- shift and tabulator at the same time

Selection from the list and from the table:

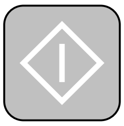
Clicking the left mouse button or moving the cursor with the arrow keys on the keyboard and pressing Space bar selects an item from the list and from the table.

When you select the same list/ table item again, the item becomes unselected.

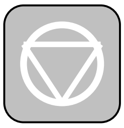
Symbol in the window	Symbol on the keyboard	Meaning / Function:
		Function, e.g. Saving, is not allowed.
		Activating the analyzer.
		Selection list.
		Changing the window.
!		STAT sample
*		Undefined value, e.g. a limit in test parameters marked with * is not checked.
	**F9**	Sample/ patient data and test requests.
	**F10**	Tests results

Symbol in the window	Symbol on the keyboard	Meaning / Function:
	**F11**	The status of all reagents in the reagent disk.
	**F12**	The analyzer's status.

1.5.2 Special Keys on the Keyboard



Start
Press START to begin analysis. Note that you must be on the Main window to get it working.



Stop
Press STOP to stop all analyzing. To restart analyzing, press START.

1.5.3 The Covers and the Leds in the analyzer

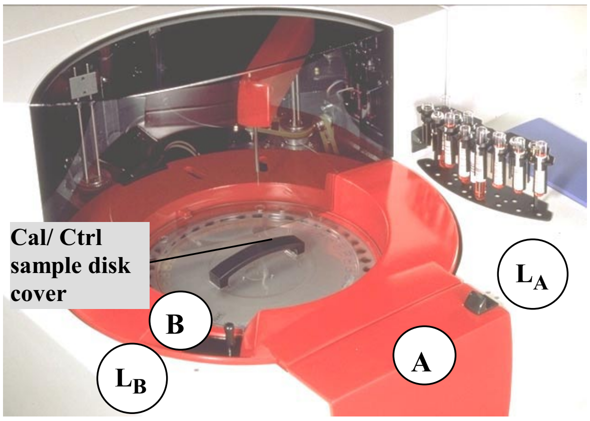
1.5.3.1 Konelab 60 and Konelab 30

A. The segment insert cover:

- When the green LED (L_A) is on, the user is allowed to open the cover.
- When the red LED is on, the user must NOT open the cover because all six segment positions are reserved or the analyzer is transporting the segment between the segment loader and the sample disk.

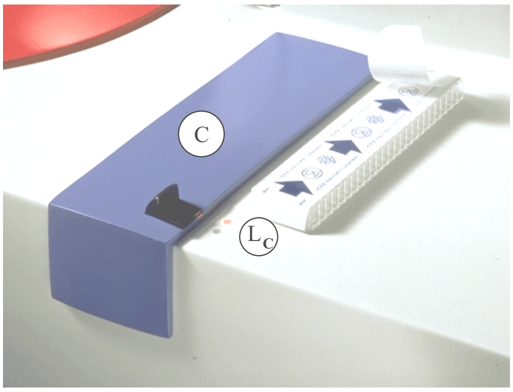
B. The STAT insert cover:

- The LED (LB) red light starts to blink when the user opens the STAT insert cover. The analyzer turns a free position to the STAT insert position. AFTER the LED stops blinking and remains green, the user can insert the STAT sample.



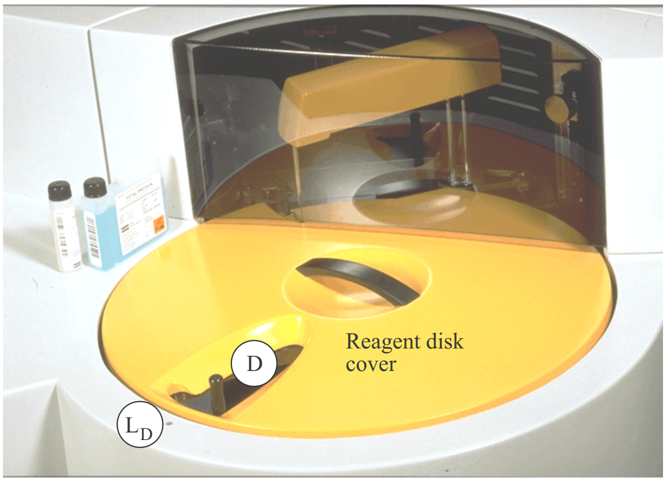
C. The cuvette loader:

- When the green LED (LC) is on, the user is allowed to open the cuvette loader cover.
- When the red LED is on, the user must NOT open the cover because the analyzer is transporting the cuvettes between the cuvette loader and the cuvette storage or the cuvette storage is full.



D. The reagent insert cover:

The LED (LD) red light starts to blink when the user opens the reagent insert cover. The analyzer turns a free position to the reagent insert position. AFTER the LED stops blinking and remains green, the user can insert the reagent.

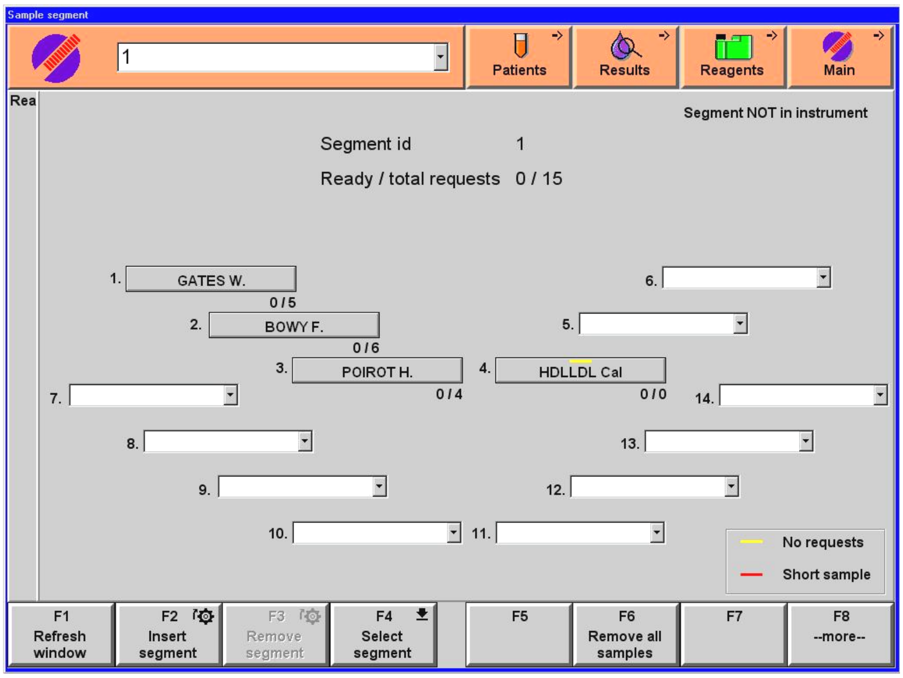


1.5.3.2 Konelab 20

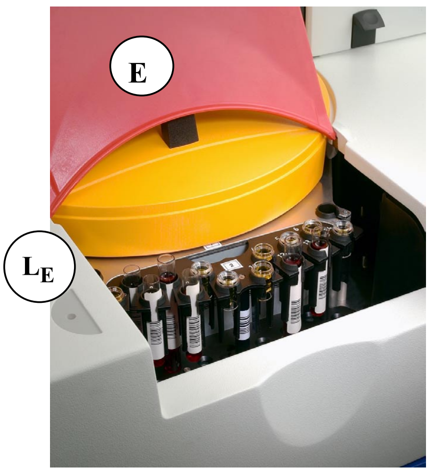
E. The segment/ Stat insert cover:

Inserting the segment

The procedure to insert segment into Konelab 20 must be started from the workstation, select F2 either in the Sample/Patient entry window or in the Segment window.

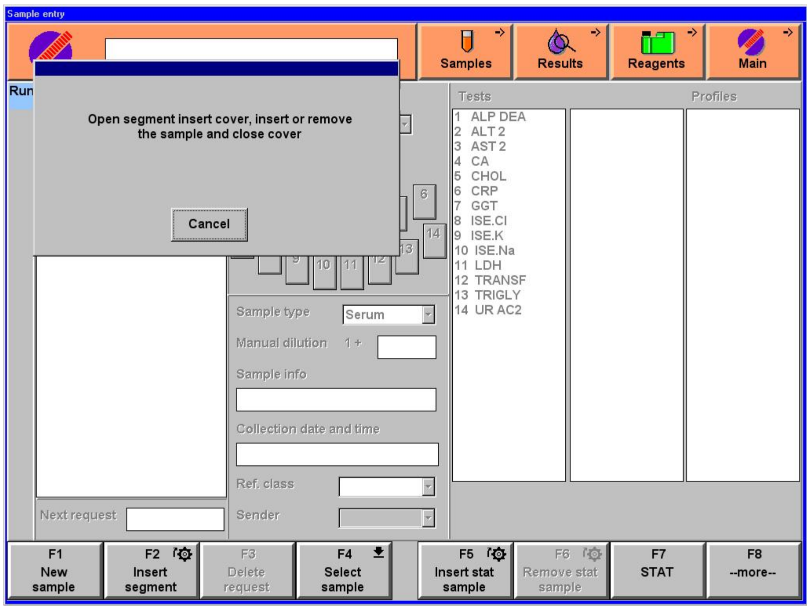


The LED (LE) starts to blink red light. The analyzer turns a free position to segment/ STAT insert position. After the LED stops blinking and remains green the user can open the cover and insert the segment. When the cover is closed the LED goes out.



Inserting the STAT sample

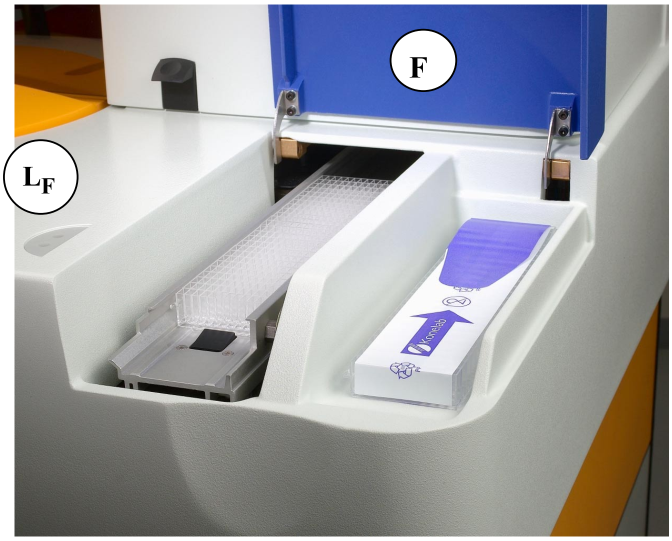
Select F5, Insert stat sample in the Sample/Patient entry window.



The LED (LE) starts to blink red light. The analyzer turns a free position to segment/ STAT insert position. After the LED stops blinking and remains green the user can open the cover and insert the STAT sample. When the cover is closed the LED goes out.

F. The cuvette loader:

- When the green LED (LF) is on the user is allowed to open the cuvette loader cover.
- When the red LED is on the user must NOT open the cover because the analyzer is transporting the cuvettes between the cuvette loader and the cuvette storage or the cuvette storage is full.

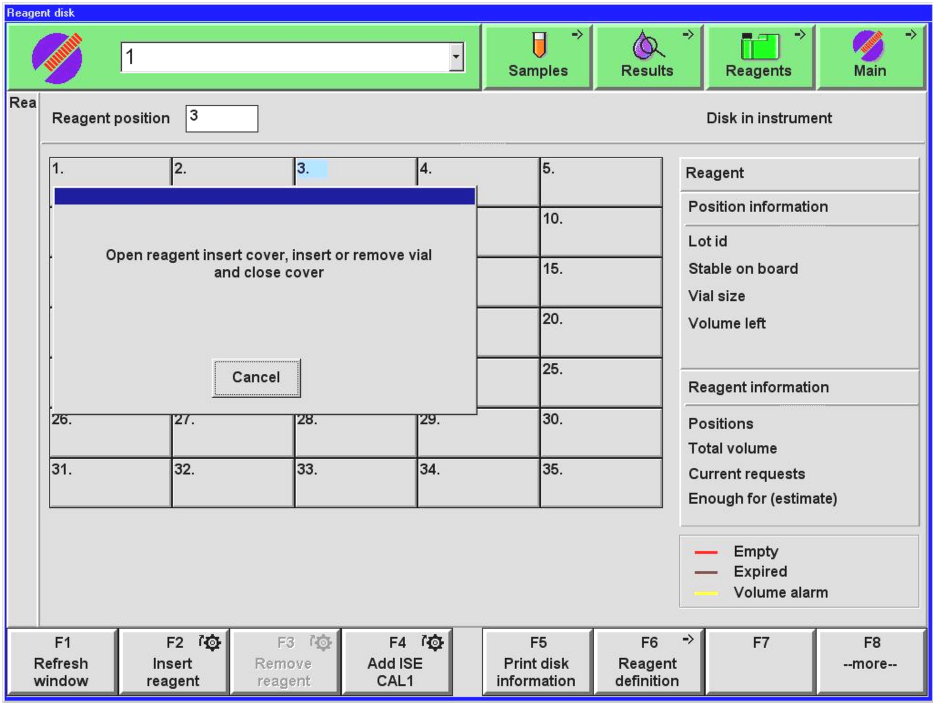


G. The reagent insert cover:

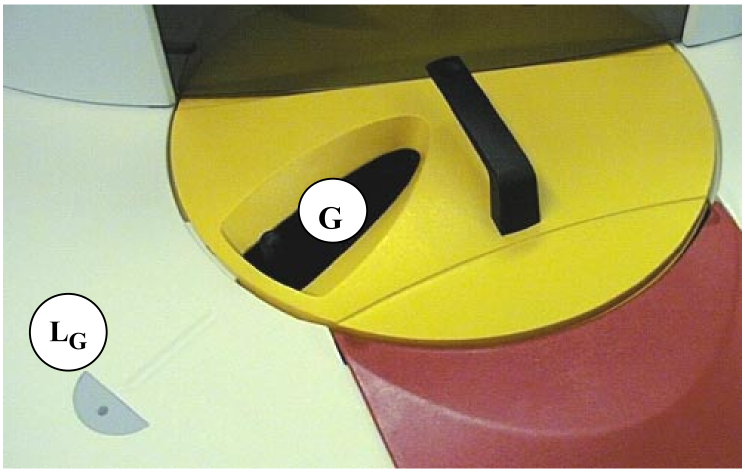
The procedure to insert reagent into Konelab 20 must be started from workstation. Select F2 in the Reagent disk window.

If user levels have been set on (refer to section 3.7 in Ref. manual) the password is required to login the instrument

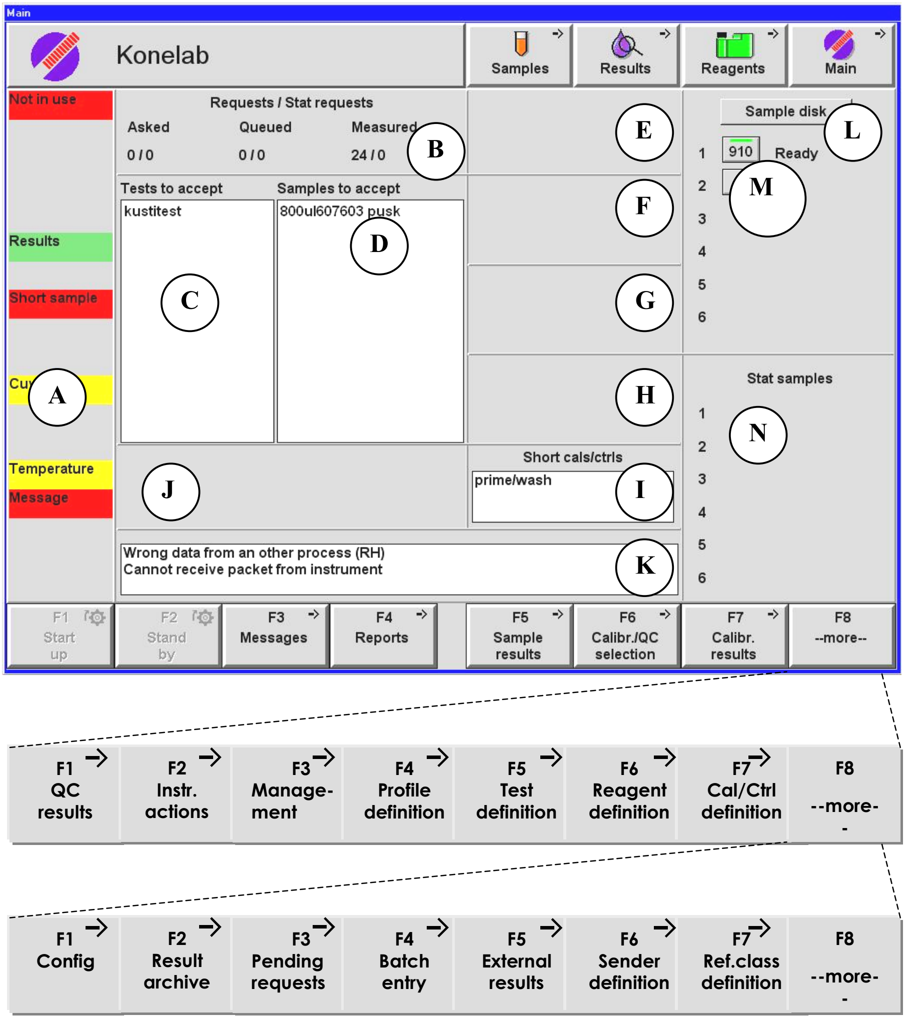
Old calibrations and reagent vials are seen in Start up. The user must insert new vials and request new calibrations or accept the old ones before continuing.To look at Maintenance actions is reminded if the workstation has not been booted during a week. Booting makes the system work faster.



The LED (LG) starts to blink red light. The analyzer turns a free position to reagent insert position. After the LED stops blinking and remains green the user can open the cover and insert the reagent vial. When the cover is closed the LED goes out.



1.5.4 Main Window



A STATUS:

- The analyzer's status (e.g. start up needed, analyzing etc.) is seen and if cuvettes are missing (for example), a red label Cuvettes appears. For further information refer to section 1.3.1 in Ref. manual.

B STATISTICS:

- The number of all unanalyzed requests, the number of unanalyzed requests in the sample disk, and the number of analyzed requests are seen.

C TESTS TO ACCEPT:

- Calibrations and tests, which have unaccepted results, are seen. Refer to sections 3.4.2 and 3.3.1 in Ref. manual.

D SAMPLES/ PATIENTS TO ACCEPT:

- Samples/ Patients, who have analyzed, unaccepted results are seen. Samples/ Patients with STAT requests are listed first. Refer to section 3.3.2 in Ref. manual.

E OPEN COVERS:

- The name of the open cover is listed. When the cover is closed, the name disappears. The covers are reagent insert cover, segment insert cover, STAT insert cover, cuvette loader, reagent disk cover, and sample disk cover.

F SHORT SAMPLES:

- List of short and old samples is seen. Refer to section 3.2.2 in Ref. manual.

G REAGENTS BELOW ALARM:

- List of reagents with volume below the defined alarm limit is seen. Refer to section 3.1.2 in Ref. manual.

H SHORT REAGENTS:

- List of short reagents is seen. Refer to section 3.1.2 in Ref. Manual.

I SHORT CALIBRATORS AND CONTROLS:

- List of short and old calibrators and controls is seen. Refer to section 3.4.1 in Ref. manual.

J INVALID TESTS:

- Invalid tests are listed; e.g., calibration, reagent or antigen excess sample is missing or the analyzer is unable to do the test because the checking of test's parameters is needed.

K MESSAGES:

- All messages are seen in the MESSAGES window with an explanation, an identification number, and time. Refer to section 8.2.

L SAMPLE DISK:

- The status of all segments and patient samples is seen. Refer to section 3.2.8 in Ref. manual.

M SEGMENTS:

- Segments on board are seen. Segment identification is in a button. Refer to section 3.2.7 in Ref. manual.

The segment's status is seen beside the button:

- *In process:* The segment is under analyzing.
- *Ready* (the green line in the button): The segment has been analyzed.
- *Not started* (a yellow line in the button): The segment is in the sample disk but the barcode is not read yet.
- *In loader:* The segment is in the loader and can be taken away.
- *Check data* (a red line in the button): There is unrecognised sample in the segment. Refer to section 3.2.7.1.1 in Ref. manual.
- *Discarded segment* (a red line in the button): The analyzer has been unable to read segment's barcode. Click the button or press F9 and further F8/F5 keys on the keyboard; with F3, remove the segment and check the barcode.

N STAT SAMPLES:

- Samples on the STAT positions are seen. Sample identification is in a button. The green line in the sample button means that the sample is ready to accept or report. The red line means short sample. Refer to section 3.2.4 in Ref. manual.

To open the needed window for further actions:

Click the name on the list (C, D, F, G, H, I and K).

Click the button (L, M and N).

- or -

Select the name from the list (C, D, F, G, H, I and K) and press the appropriate key on the keyboard, e.g. F10 to open the TEST RESULTS window. Press the appropriate keys on the keyboard (L, M and N), e.g. F9 and further F8/F6 keys to open the SAMPLE SEGMENT window.

1.5.5 Brief Description of Windows

Batch entry Functions to give test requests for a batch of samples. Refer to section 3.2.2.3 in Ref. manual.

Configuration In the Configuration window, the user can see e.g., the installed wavelengths. In addition the user can e.g., define the criterion for data entering: sample or patient, change the default sample type used in Sample/ Patient entry, define the printing type: manual or automatic and connect the ISE unit on and off. Refer to section 3.8 in Ref. manual.

LIMS configuration The used laboratory information management protocol is defined. Refer to section 3.8.1 in Ref. manual.

Management Functions to stop the instrument immediately and to clear the daily files and simultaneously to save accepted QC results to the cumulative data. Refer to section 3.6 in Ref. manual.

User management Functions to set user levels on and change passwords. Refer to section 3.7 in Ref. manual.

Restrictions Functions to determine different user levels. Refer to section 4.10 in Ref. manual.

Messages Detailed information from the messages is seen. Refer to section 8.2.

Profile definition Functions to define the profiles. Refer to section 4.7 in Ref. manual.

Reagent definition Functions to give the reagent data. Refer to section 3.1.3 in Ref. manual.

Reagent disk The status of all reagents in the reagent disk is seen in this window.

The user has access to the REAGENT DISK window from every window. Refer to section 3.1.1 in Ref. manual

Reference class definition Functions to define reference classes. Refer to section 4.8 in Ref. manual.

Reports Functions to report the results manually. Refer to section 3.5 in Ref. manual.

LIMS connection Functions to manually ask requests or send results online. Refer to section 3.5.1 in Ref. manual.

Sample disk The status of all segments and patient samples on board is seen in this window. Refer to section 3.2.8 in Ref. manual.

Sample/ Patient entry Functions to give sample/patient data and test requests. The criterion for the data entering (sample or patient) is defined in the Configuration window.

The user has access to the SAMPLE/ PATIENT ENTRY window from every window. Refer to section 3.2.2 in Ref. manual.

Sample list A brief preview of all samples is seen in this window. Refer to section 3.2.9 in Ref. manual.

Sample/ Patient results Functions to see the results of samples/ patients. The unaccepted results can be accepted, rejected, or rerun. Refer to section 3.3.2 in Ref. manual.

Sample segment The status of sample segment with all 14 positions is seen. Refer to section 3.2.7 in Ref.manual.

Pending requests Pending requests and the time estimation for analyzing them are seen in this window. Refer to section 3.2.10 in Ref. manual.

Sender definition Functions to define the sender data, which is seen in Sample/ Patient entry and in reports. Refer to section 4.9 in Ref. manual.

Calibrator & Control definition Functions to define calibrators and controls and to give the test values. Refer to section 4.6 in Ref. manual.

Calibration parameters Functions to define the test calibration parameters. Refer to section 4.4 in Ref. manual.

Calibration results The status of the test calibration is seen. Calibration can be accepted and compared to the previous one. Every calibration request can be rejected and rerun. Refer to section 3.4.2 in Ref. manual.

Calibration/ QC selection The list of tests in the order of the calibration status and the status of calibrators is seen.

The user can calibrate the test and ask the Manual QC for the test. The status of controls is seen. Refer to section 3.4.1 in Ref. manual.

Quality control results Cumulative data and quality control results are seen on the lists or graphically. Refer to section 3.4.3 in Ref. manual.

Results by controls Daily quality control results by controls are seen. Refer to section 3.4.4 in Ref. manual.

Quality control parameters Functions to define tests' quality control parameters for manual qc and routine qc. Refer to section 4.5 in Ref. manual.

Test definition Functions to define tests. Tests' general parameters are given in this window. Refer to section 4.1 in Ref. manual.

Test flow Functions to define the test flow i.e. the parameters for reagent and sample dispensings, for dilution, incubation and measurement. Additional mixing can also be defined. Refer to section 4.2 in Ref. manual.

Electrodes Function to define which electrodes is used. Refer to section 4.3 in Ref. manual.

Test results Functions to see the results of the tests. Unaccepted results can be accepted, rejected or rerun.

The user has access to the TEST RESULTS window from every window. Refer to section 3.3.1 in Ref. manual.

External results Functions to enter results for tests analyzed by other instruments to provide fully collated patient reports. Refer to section 3.2.6.1in Ref. manual.

Result archive Result archive includes sample and control results. Refer to section 3.9 in Ref. manual.

Calibration archive Calibration archive includes old, accepted calibrations. Refer to section 3.9.1 in Ref. manual.

Reagent lot archive Reagent lot archive includes information of used reagent lots. Refer to section 3.9.2 in Ref. manual.

Statistics Both daily and cumulative number of accepted and rejected requests of samples, calibrators and controls are seen test by test. Refer to section 3.10 in Ref. manual.

Report formats Functions to format the patient, sample, or test report. Refer to section 3.11 in Ref. manual.

Instrument actions Functions for the user service actions, e.g. to order water blank and ISE prime and to remove cuvettes. Adjustment and test programs for Service Engineers. Refer to section 3.12 in Ref. manual.

Water blank Functions to check water blank measurements wavelength by wavelength. Refer to section 3.13 in Ref. manual.

Maintenance Maintenance checking table. The user is reminded to perform tasks after the given time period. Refer to section 6.1 in Ref. manual.

Accuracy results After the preventive maintenance done once per year, it is recommended to perform accuracy measurements to check the condition of instrument. Results of these measurements are seen in this window. Refer to section 6.4 in Ref. manual.

Accuracy factors Accuracy measurements are done with the accuracy solution kit. Authority measures values of these solutions. Lot dependant factors, affecting accuracy result calculations, are given in this window. Refer to section 6.4.1 in Ref. manual.

1.6 Operation Principle

1.6.1 Photometric Measurement

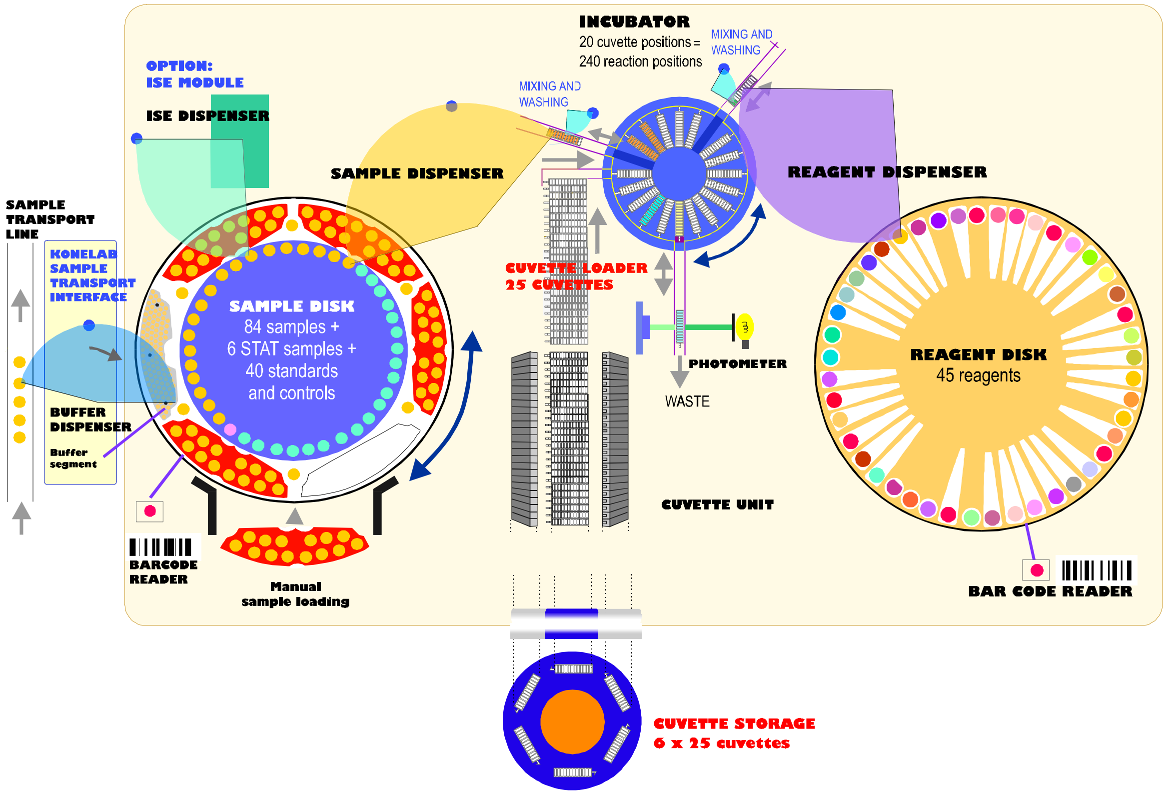


Figure 1-10 Photometric analysis proceeding in Konelab 60.

Multicell cuvettes are transported in the Konelab by precisely controlled cuvette arms. The arm takes a cuvette from the loader and places it into a free slot in the incubator. When the incubator rotates in Konelab 60 the cuvette is first moved to the photometer to check its optical quality and after that to the dispensing positions where the dispensing arms dispense sample and reagents appropriate to the test. The mixer in both dispensing positions performs efficient mixing.

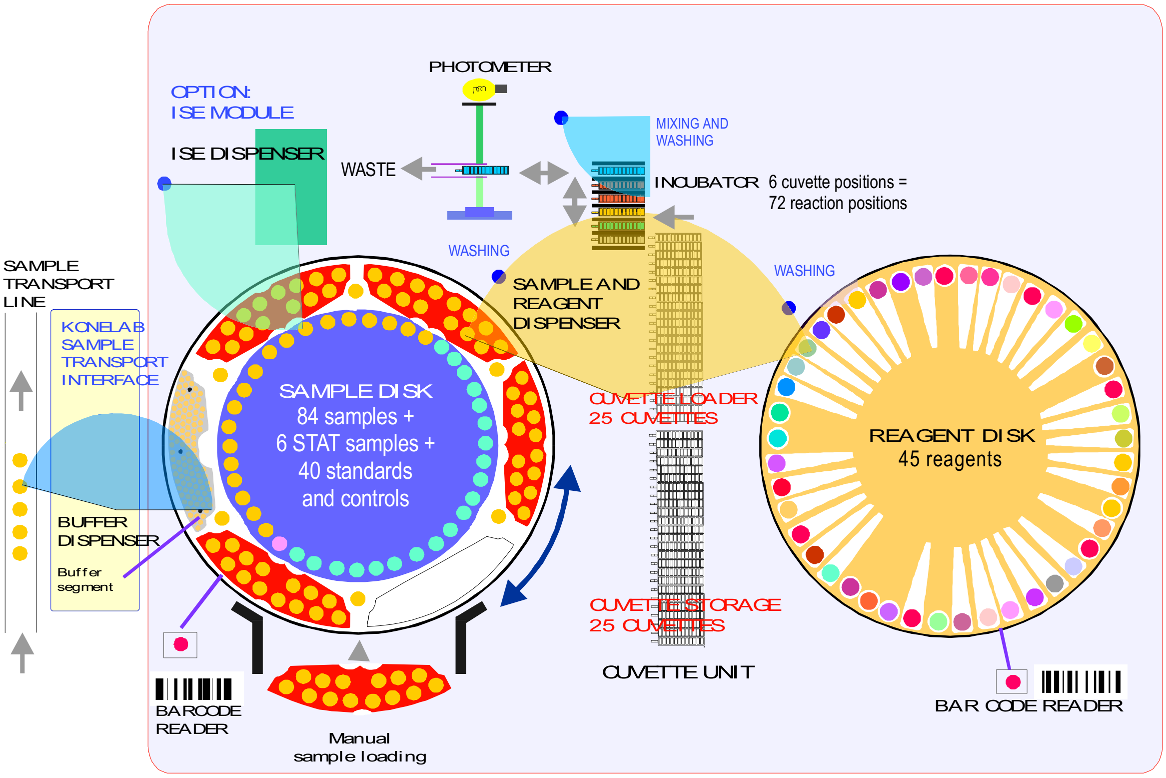


Figure 1-11 Photometric analysis proceeding in Konelab 30.

In Konelab 30 the cuvette is also first moved to the photometer to check its optical quality. After that the cuvette is placed in the incubator where the dispensing arm dispenses sample and reagents appropriate to the test. The mixer performs efficient mixing.

The cuvette is then moved through the photometer. The photometer measures the absorbance of one cell of the multicell cuvette at a time. It is possible to make a fixed measurement, i.e. so that the time between dispensing and measurement is the same with every cell of a test's cuvette.

In the kinetic measurement the absorbance measurement is repeated as many times as defined in the test parameters during the given time period. The maximum number of the measurements is 12 and the maximum time is 20 minutes.

After measurement the cuvette is discarded into the waste compartment.

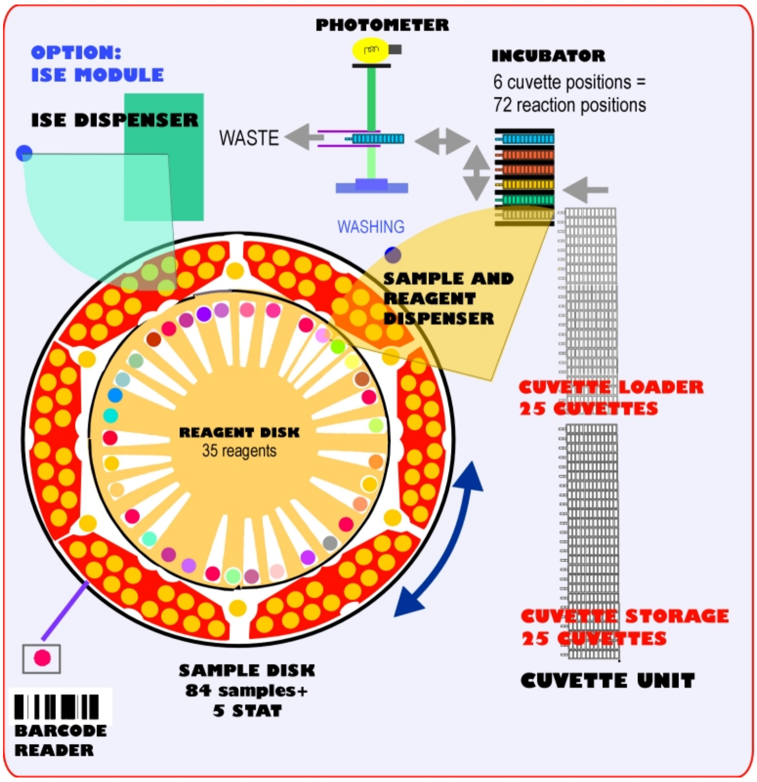


Figure 1-12 Photometric analysis proceeding in Konelab 20.

In Konelab 20 the cuvette is first moved to the photometer to check its optical quality. After that the cuvette is placed in the incubator where the dispensing arm dispenses sample and reagents appropriate to the test. The efficient vibration of the dispensing needle in the cuvette cell performs mixing.

The cuvette is then moved through the photometer. The photometer measures the absorbance of one cell of the multicell cuvette at a time. It is possible to make a fixed measurement, i.e. so that the time between dispensing and measurement is the same with every cell of a test's cuvette.

In the kinetic measurement the absorbance measurement is repeated as many times as defined in the test parameters during the given time period. The maximum number of the measurements is 12 and the maximum time is 20 minutes.

After measurement the cuvette is discarded into the waste compartment.

DISPENSING

Konelab 60 has separate dispensers for samples, reagents and ISE tests. Konelab 30 and 20 has common dispenser for samples and reagents but separate for ISE tests. The dispensers are equipped with a level detector, which ensures that there is enough sample/reagent for the analyzes requested. The level detector also controls the depth of immersion of the needle in the sample cup.

A sample is dispensed either into a new cuvette or into the partly used cuvette. One cuvette consists of twelve reaction cells.

The sample/ reagent can be dispensed to the cuvette with water or with a sample/ reagent extra. The water volume is dispensed to the cell with the sample/ reagent. The extra volume is discarded after the real volume is dispensed.

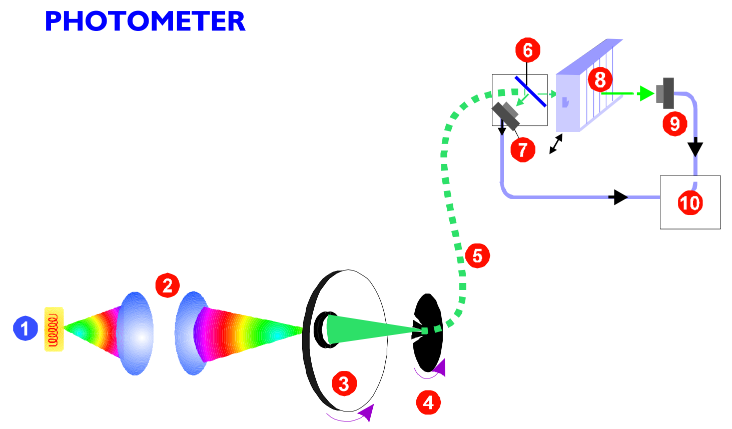


Figure 1-13 The operation principle of the photometer.

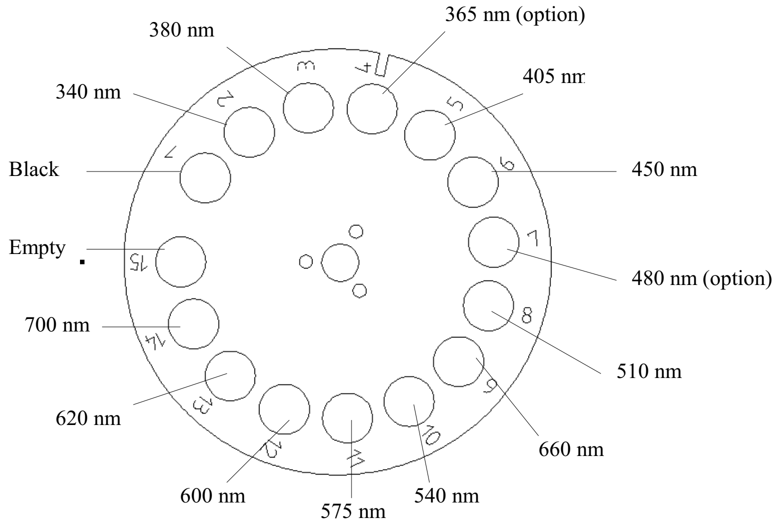
1. Halogen lamp
2. Condensing lenses
3. Filter wheel
4. Light chopper
5. Quartz fibre
6. Beam divider
7. Reference detector
8. Multicell cuvette
9. Signal detector
10. Measurement electronics

The light goes from the lamp through the condensing lenses to the interference filter. The plane surface of the first condensing lens is coated with the material, which reflects heat and infrared light. The filters are mounted on a filter wheel. In the standard instrument there are 15 positions for filters.

After the filter the light is converted into a stream of light pulses by the chopper. Then the light is led via the quartz fibre through the focusing lens and the slit to the beam divider.

The beam divider divides the light into two parts. A certain amount is reflected to the reference detector, which monitors the light level fluctuations. The main part of the light goes through the liquid in the cell to the signal detector, which measures the amount of light after absorption.

FILTER WHEEL



1.6.2 ISE Measurement

The Konelab measures:

- Na, K and Cl in serum and plasma,
- Na and K in urine,
- Li, which is offered as an option, in serum and plasma.
- Ca and pH in Konelab 60 and 30, which are offered as an option, in serum and plasma.

The measurement is done with the direct ISE technique. The measured sample activity is compared to the activity of calibrators, which are adjusted to mimic activity normally found in serum samples.

The electrode block is comprised of the measurement electrodes and the reference electrode. The potentials produced at each membrane are measured once every second.

One dispensing arm, one pump and one 500 *l syringe are provided for the ISE measurement in Konelab 60 and 30. In Konelab 20 one dispensing arm and FMI pump perform the ISE measurement. A sample is aspirated through the needle from the sample cup. The sample is moved to the electrode block where the measurement takes place.

Sample measurement is followed by ISE Calibrator solution 1 measurement. The ISE dispensing pump transfers ISE Calibrator solution 1 from the bag to the block. At the same time the sample is discarded. After the measurement ISE Calibrator solution 1 is pumped through the needle to the waste.

The tubes and the measurement channel of the ion selective electrode block are washed with the Washing Solution. The solution is dispensed via the dispensing arm into the block. From there it is pushed by the ISE washing pump into the wastewater container. The washing procedure is done during the STAND BY function.

MEASUREMENT PRINCIPLE

Each ion-selective electrode has an electrode -specific membrane. The membrane will attract the desired ion to the membrane phase when the sample solution comes into contact with it. The potential of each ion-selective electrode is measured against the reference electrode. The potential difference is developed at the electrode membrane. This potential (in mV) is read and amplified sequentially. It should reach the 'steady state' stage within a given time interval. If the measurement does not stabilise in an allowed time the measurement is repeated once. In case of repeated instability an error message is given.

Section 2 Adjustments

2.1 Adjustments of Konelab 60

2.1.1 General

Note!
Keep CapsLock OFF when adjusting

Keys in use	Alternative keys	Function
1 - 9		Module selection
Y/N	ALT+89/ ALT+78	To save / cancel changes
N	ALT+78	Next
I	ALT+73	Initialisation
R	ALT+82	To restore old adjustment
A <-> **S**	ALT+97 – ALT+115	**1. Motor, Left** <-> **Right movement**
Shift + **A** <-> **S**	A+65 – ALT+83	Left - Right with a long movement
W <-> **Z**	ALT+119 – ALT+122	**2. Motor, Up** <-> **Down movement**
Shift + **W** <-> **Z**	ALT+87 – ALT+90	Up-Down with a long movement
C <-> **V**	ALT+99 – ALT+118	**3. Motor, Forward** <-> **Backward**
Shift + **C** <-> **V**	ALT+67 – ALT+86	Forward - Backward with a long movement
b	ALT+98	To read barcode in the reagent disk / sample disk. (In the sample disk, the segment barcode is read.)
B	ALT+66	In the sample disk, segment and tube barcodes are read.
T	ALT+84	Automatic BCR reading position adjustment
M	ALT+77	To rotate mixer when adjusting mixer cuvette positions
Q	ALT+81	Quit

Note!

During adjustment program, sample / reagent covers can be taken off. In that time the analyzer is not responding to the opening of covers.

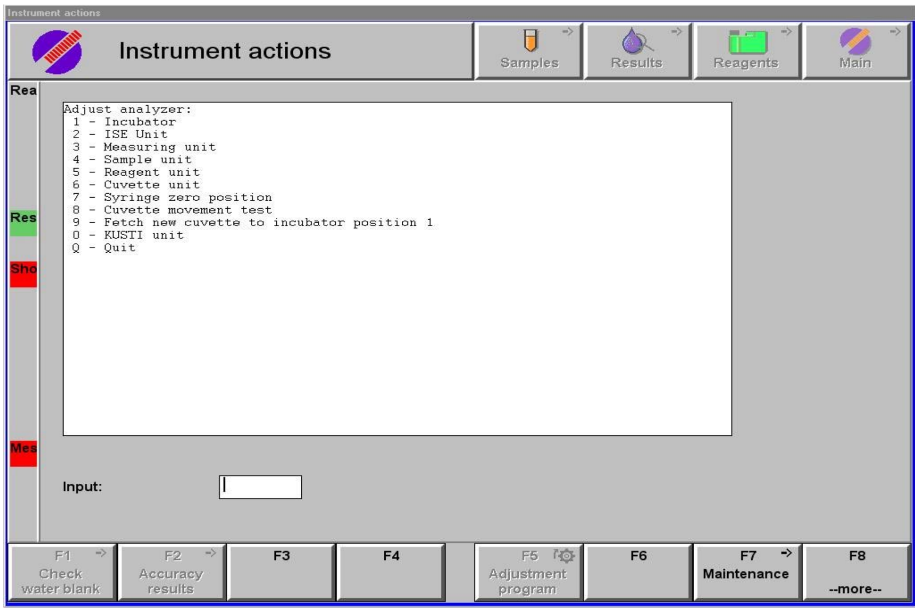
Attach the covers back before quitting the adjustment program.

Note!

After each maintenance or adjustment procedure QC run is recommended !

2.1.2 How to Start Adjusting ?

- Open Konelab user interface:
- Click Main -button
- Press F8 -key (More)
- Press F2 -key (Instr. Actions)
- Press F8 (More)
- Press F5 (Adjustment program)



Recommended order to adjust

- Cuvette unit
- Incubator
- Reagent unit
- Sample unit
- Measuring unit
- ISE unit
- KUSTI unit

Good to know

- The instrument adjusts **'Syringe zero position'** automatically. (refer section 2.1.10)
- The instrument performs '**Cuvette movement test**' automatically
- '**Fetch new cuvette to incubator position**' is recommended to use when a cuvette has to be moved to the selected incubator position. (E.g. for adjustment of measuring positions in measuring unit (refer section 2.1.7.3))

Note!

After each adjustment section program asks:

"Save adjustments (y / n) ?"

Press key Y (yes) to save adjustments automatically to internal PC hard disk.

Dispenser needles / Mixer paddle

- Before the adjustment of dispensers and mixer, the arms of them have to be adjusted mechanically so that needles go to their checking points. Refer to checking points below.

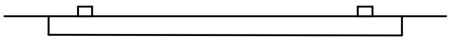
Needle / Paddle checking points are the following:

Reagent Dispenser	The hole in the reagent dispensing station
Sample Dispenser	The hole in the sample dispensing station
ISE dispenser	The left edge of the washing station
KUSTI dispenser	The right edge of the washing station
Mixers	The right edge of the dispensing hole in the reagent / sample dispensing station

2.1.3 Cuvette Unit

Adjustment tools needed:

- a feeler gauge (886650)



Note!

Pusher is moving cuvettes from the revolver to the cuvette feeder.

Mover is moving cuvettes from the feeder to the incubator.

Cuvette unit adjustments are:

1. Revolver
2. Latch
3. Pusher
4. Mover

Note!

- **Remove all cuvettes from feeder.**
- **Keep the menu order when adjusting, especially if the instrument is new or adjustments are in disorder.**

1. Revolver

Note!

Make sure that the pusher is not blocking the revolver movement.

Revolver 1 position:

• Adjust revolver slot 1straight against cuvette feeder.

Revolver positions 2-6 are adjusted in a similar way.

Revolver free position:

• Pusher must move freely to open position.

Save adjustments y/n?

2. Latch

Note!

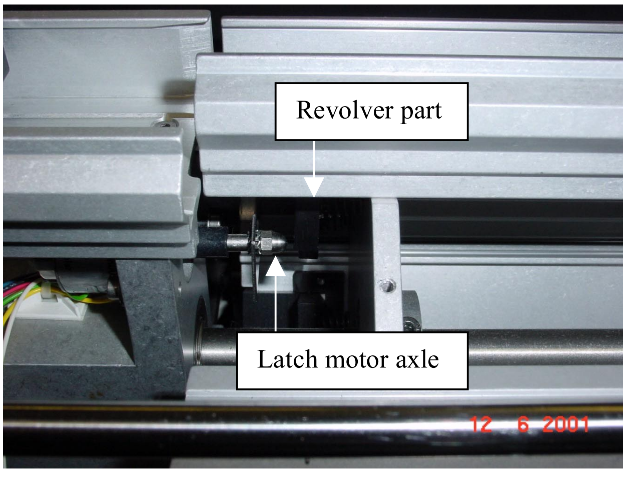
Make sure that the pusher is not blocking the revolver movement.

Latch open position:

- When the latch is open make sure that it is below the cuvette feeder base. Cuvettes must move over the latch without touching it.

Latch closed position:

- The revolver must rotate freely without hitting the latch motor axle.



Save adjustments y/n?

3. Pusher

Note!

Make sure that the feeder is empty and revolver can rotate freely.

Pusher open position:

- The pusher will automatically find out the location of the opto.
- Adjust 1- 2 mm clearance between the pusher and revolver.

Pusher position for cuvette fetch:

- Insert one cuvette into the loader when command is seen on the screen.

First the program will automatically adjust the distance to cuvette sensing opto.

For example:

- On the screen is seen text : "Adjusting pusher position for cuvette fetch, opto detected at -74063".
- Compare opto value to adjustment value.
- Adjust 4-6 steps more from detection point. Adjustment absolute value must be bigger.

Note!

Each time when Pusher position for cuvette fetch is adjusted, Incubator (2.1.4) Cuvette loader position must be checked /adjusted.

Save adjustments y/n?

4. Mover

Note!

- Take incubator covers off.
- Turn an empty incubator position against cuvette feeder.

Mover position in incubator:

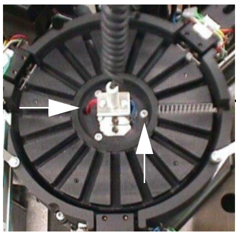
- Mover will push one cuvette to the incubator.
- Adjust the mover that there is 0.1 mm distance between cuvette rear end and incubator wall. Use a feeler gauge (886650).

Save adjustments y/n?

2.1.4 Incubator

Adjustment tools needed:

- Take incubator metal cover off.
- A cuvette in incubator position 1.



Incubator position1 is next to mounting cross headed screw and opposite side is a hole for heating wires going under incubator block.

Note!

All cuvette arms are powerless. Check manually cuvette movement from incubator to stations during adjustments.

Incubator adjustment positions are:

- Reagent channel
- Sample channel
- Measuring channel
- Cuvette loader
- Manual cuvette exit

All positions are adjusted according the Incubator position 1. Other position (2-20) are calculated by the software.

Reagent channel:

- Fetch cuvette manually with cuvette arm.
- Move cuvette into the channel and check that cuvette is not touching to guiding bearings.
- Adjust incubator if needed.

Sample / Measuring channel is adjusted in a similar way.

Cuvette loader:

- Move cuvette from loader to incubator by rotating the Mover belt wheel manually and check that the cuvette moves straight to incubator position 1.
- Adjust incubator if needed.

Manual cuvette exit:

- In the right side of incubator vessel assembly is a exiting hole.
- Exit cuvette manually.
- Adjust incubator if needed.

After adjustment, the program asks if wanted to check all incubator positions:

Check adjustments y/n?

If answered y (yes), all incubator positions can be checked in reagent, sample and measurement station position.

Check all positions (1-20) with a cuvette, because incubator motor steps are not equal. Adjust the position 1 again if necessary. The final adjustment should be the best possible choice for all incubator positions (1-20).

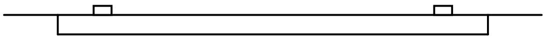
Save adjustments y/n?

2.1.5 Reagent Unit

2.1.5.1 Cuvette Arm

Adjustment tools needed:

- A cuvette in incubator position 1.
- feeler gauge (886650)



Cuvette arm adjustment position is:

- Incubator position

Incubator position:

- The adjustment is valid when you can hardly lift the feeler gauge (0.1 mm) from the space between the cuvette rear end and the incubator wall .

Save adjustments y/n?

2.1.5.2 Reagent Disk

Adjustment tools needed:

- Empty bar-coded 20 ml reagent bottle

Reagent disk adjustment positions are:

- Vial inserting position
- Barcode reader position

Vial inserting position:

- Open vial/inserting cover and insert a reagent bottle to disk.
- Adjust reagent disk if needed.

Barcode reader position:

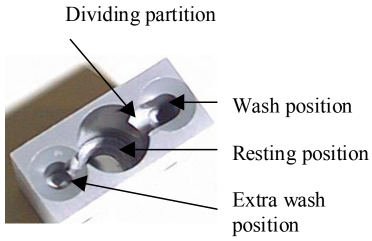
- Press **b** to read the reagent bottle barcode.
- If reading is OK, no beep is heard. By adjusting the disk, find the both ends of the reading area until beep sound is heard.
- Count the steps from side to side and set the adjustment to the middle.

Save adjustments y/n?

2.1.5.3 Reagent Dispenser

Reagent dispenser adjustment positions are:

- 1. General positions
- 2. Cuvette positions
- 3. Reagent positions
- 8. Test wash



1. General positions

- Phi drive level position
- Needle check position
- Manual needle wash position
- Wash position
- Extra wash position
- Resting position

Phi drive level:

- Adjust needle tip 3 - 4 mm above the reagent disk where the reagent dispenser moves.

Needle check position:

- The needle check position is a hole in the reagent dispensing station.
- Adjust the needle tip close to the dispensing station's top surface level.

Manual needle wash position:

- Adjust the needle to the middle of the washing station and reagent dispensing unit. (= 15 long steps from edge of the washing station)

Wash position:

- Move the needle over the dividing partition.

Y-movement:

- Press **Z** (⇓) and find the position when the needle is touching the dividing partition.
- **Adjust 3 steps up W (⇑)** from the partition

Phi-movement:

- Adjust back to the middle of the wash position.

Extra wash position:

Phi movement:

- Adjust to the middle of the extra wash position.
- Wash position Y-movement adj. value is used in Extra wash position.

Resting position:

- Dispenser arm is adjusted 1 mm above the stick.
- Adjust the Phi-movement to the middle of the resting position.

Save adjustments y/n?

2. Cuvette positions

- Cuvette cell 1 upper position
- Cuvette cell 1 position
- Cuvette cell 12 position

Note!

Cuvette arm is adjusted cell 1 upper / cell 1 positions.

- Insert a cuvette into the reagent arm if there is not already.

Cuvette cell 1 upper position:

Phi-movement:
- Adjust dispenser needle to the middle of the cuvette cell

Cuvette arm:
- Adjust arm that needle is in the middle of the cuvette cell 1.

Y-movement:
- Adjust the needle tip 1 mm under the cuvette top surface.

Cuvette cell 1 position:

Phi-movement:
- Adjust dispenser needle to the middle of the cuvette cell 1.

Cuvette arm:
- Adjust arm that needle is in the middle of the cuvette cell 1.

Y-movement:
- Press **Z** (⇓) and find the position when the needle is touching the bottom of the cuvette.
- **Adjust 3 steps up W (⇑) from the bottom.**

Cuvette cell 12 position:

Phi-movement:
- Adjust dispenser needle to the middle of the cuvette cell 12.

Y-movement:
- Press **Z** (⇓) and find the position when the needle is touching the bottom of the cuvette.
- **Adjust 3 steps up W (⇑) from the bottom.**

Save adjustments y/n?

3. Reagent position:

- Cuvette cell 1 upper position
- Cuvette cell 1 position
- Cuvette cell 12 position

Note!

- **Take reagent cover off.**
- **Insert 20 ml reagent bottle into the reagent disk positions 1, 12, 23 and 35.**
- **Each reagent bottle position have an own bottom adjustment value.**

Reagent disk position cups:

Phi-movement:

- Adjust dispenser needle to middle of the bottle neck.

Reagent disk:

- Adjust disk that the needle is in middle of the bottle neck.

Y-movement:

- Press **Z** (⇓) and find the position when the needle is touching the bottom of the bottle.
- **Adjust 4 steps up W (⇑) from the bottom.**

Positions 12, 23 and 33:

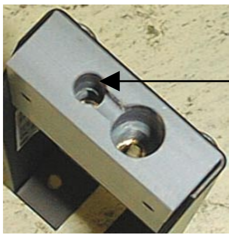
- Check Y-movement 4 steps up from the bottom.

Save adjustments ?

2.1.5.4 Reagent Mixer

Reagent mixer adjustment positions are:

- 1. General positions
- 2. Cuvette positions
- 9. Test mixing in cuvette



Wash position

1. General positions

- Phi drive level position
- Paddle check position
- Manual needle wash position
- Wash position
- Resting position

Phi drive level:

- Adjust mixer paddle tip 4-5 mm above the reagent dispensing station.

Paddle check position:

- Adjust the mixer paddle tip to the right edge of the dispensing hole in the reagent dispensing station.
- Adjust the paddle tip close to the dispensing station's upper surface level.

Manual needle wash position:

Phi-movement:
- Adjust mixer paddle to the middle of the dispensing reagent unit. (= 120 long steps from the wash position)

Y-movement:
- Adjust mixer paddle tip 20 long steps up from the surface of the washing station.

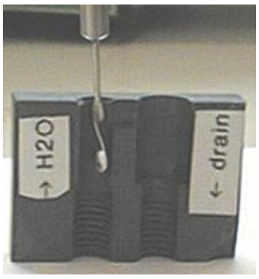
Wash position:

Phi-movement:

• Adjust mixer paddle to the middle of the washing position.

Y-movement:

• Straight part of the paddle is above the washing station as shown in figure under.



Resting position:

Phi-movement:

• Adjust paddle to the middle of the wash position.

Y-movement:

• Adjust the mixer arm 1 mm above the rubber.

Save adjustments y/n ?

2. Cuvette positions

• Insert a cuvette into the reagent arm if there is not already.

Cuvette cell 1position:

Phi-movement:

• Adjust the mixer paddle to the middle of the cuvette cell.

Y-movement:

• Press **Z** (⇓) and find the position when the paddle is touching the bottom of the cuvette.

• Adjust 3 steps up W (⇑) from the bottom.

• Press key m to check that the mixer can rotate freely.

Cuvette cell 12 position:

Phi-movement:

• Adjust the mixer paddle to the middle of the cuvette cell.

Y-movement:

• Press Z (⇓) and find the position when the paddle is touching the bottom of the cuvette.

• Adjust 3 steps up W (⇑) from the bottom.

• Press key m to check that the mixer can rotate freely.

Save adjustments y/n?

9. Test mixing in cuvette:

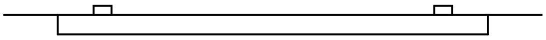
• Mixing is tested in all 12 positions in cuvette.
• If mixing is noisy, readjust cuvette cell 1 and 12 positions.

2.1.6 Sample Unit

2.1.6.1 Cuvette Arm

Adjustment tools needed:

- A cuvette in incubator position 1.
- feeler gauge (886650)



Cuvette arm adjustment is:

Incubator position:

- The adjustment is valid when you can hardly lift the feeler gauge (0.1 mm) from the space between the cuvette rear end and the incubator wall.

Save adjustments y/n ?

2.1.6.2 Sample Disk

Sample disk adjustments are:

- Segment / vial inserting position, segments 1-6
- Barcode reader position, segments 1-6
- STAT sample inserting, positions 1-6
- Barcode reader position, STAT samples 1-6
- Segment loader positions

Note!

- **Segment loader is powerless during adjustment.**
- **It can be moved manually. Be sure that loader is not blocking sample disk movement when entering next position.**
- **Take sample cover off.**

Segment / vial inserting position segment position 1:

- Move the segment loader to down position
- Adjust the disk that segment is in correct position when loader lifts it out.
- Check movement manually that segment loader´s 2 pins goes straight through segment´s bottom plate holes.

Note!

Good quality barcode stickers are needed.

Barcode reader position segment position 1:

- Insert a segment with barcoded sample tubes into the sample disk position 1.
- **Press b to read the segment barcode**. If reading is OK, no beep is heard. By adjusting the disk, find the both ends of the reading area until beep sound is heard.
- Count the steps from side to side and set the adjustment to the middle.

Automatic BCR adjustment:

- After the segment barcode reading position is adjusted, the analyser will adjust the barcode reading positions automatically for all sample tubes. **Press T to start adjustment.**
- When the automatic adjustment has been made, new and old values are seen on the screen and asked:

  Save new values y/n?
- You can check the segment and tube barcode readings. **Press B (Shift + b)**.
- When the first segment has been adjusted the program asks if the user wants that all other 5 segment positions are calculated:

  Calculate other segment positions before adjusting them? y/n Choose *Yes*.

Note! All other positions (2-6) are adjusted in a similar way.

- **Save adjustments y/n?**

STAT sample inserting position:

- With cover on, insert a sample tube into the STAT sample position 1.
- Adjust disk if needed.

Barcode reader position:

- Insert barcoded sample tube into the STAT sample position 1.
- **Press b to read the sample tube barcode**. If reading is OK, no beep is heard. By adjusting the disk, find the both ends of the reading area until beep sound is heard.
- Count the steps from side to side and set the adjustment to the middle.
- When the STAT sample position 1 has been adjusted, the program asks if the user wants that all other 5 STAT sample positions are calculated:

Calculate other STAT positions before adjusting them? y/n. Choose *Yes*.

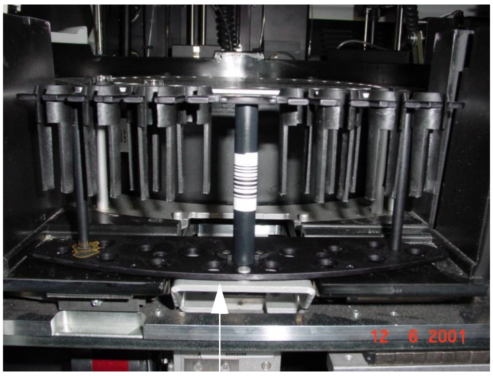
STAT sample inserting / barcode positions 2-6 are adjusted in a similar way.

- **Save adjustments y/n?**

Segment loader positions:

Segment loader up position:

- Segment must rest over the sample unit, not over the segment loader. Adjust about **1 mm space** between the segment bottom and loader.



1 mm space between segment and loader

Important!

Sample disk position 1 must be empty. Close the segment loader cover before next (n) position.

Segment loader positions

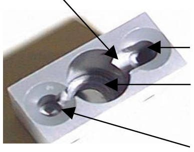
Segment loader down position:

- Adjust the loader that the sample disk can rotate freely without touching the segment loader pins.
- Distance between sample disk bottom and loader pins is **2-3 mm**. **DO NOT** adjust it lower because the loaders mechanical movement area ends.
- **Save adjustments y/n?**

2.1.6.3 Sample Dispenser

Dispenser adjustment positions are:

1. General positions



- Phi drive level position
- Needle check position
- Manual needle wash position
- Wash position
- Extra wash position
- Resting position

2. Cuvette positions
4. STAT positions, all 6
5. Standard / Control positions, all 40
6. Segment positions

- Outer ring, position 10 for all 6 segments
- Inner ring, position 3 for all 6 segments
- Sample tube in position 11 for the segment position 1

7. KUSTI segment positions
8. Test wash

1. General positions

Phi drive level position:

- Adjust dispenser needle 3 - 4 mm above the sample disk where the sample dispenser moves.

Needle check position:

- The needle check position is a hole in the sample dispensing station. Adjust the needle tip to the dispensing station's top surface level.

Manual needle wash position:

- Adjust dispenser needle 20 long steps outside from edge of the sample disk.

☛

Wash position:

• Move the needle over the dividing partition.

Y-movement:

• Press Z (⇓) and find the position when the needle is touching the dividing partition.

• **Adjust 3 steps up W (⇑) from the partition.**

Phi movement:

• Adjust to the middle of the wash position.

☛

Extra wash position:

Phi movement:

• Adjust to the middle of the extra wash position. Wash position Y-movement adj. value is used in Extra wash position.

☛

Resting position:

• Dispenser arm is adjusted about 1 mm above the stick.

• Adjust the Phi-movement to the middle of the resting position.

Save adjustments y/n?

2. Cuvette positions

- Cuvette cell 1 upper position
- Cuvette cell 1 position
- Cuvette cell 12 position

Insert a cuvette into the sample arm if there is not already. (refer section 2.1.6.1)

Note!

Incubator is adjusted cell 1 upper / cell 1 positions.

Cuvette cell 1 upper position:

Phi-movement:
- Adjust dispenser needle to the middle of the cuvette cell 1.

Cuvette arm:
- Adjust arm that needle is in the middle of the cuvette cell 1.

Y-movement:
- adjust the needle tip **1 mm under** the cuvette top surface.

Cuvette cell 1 position

Phi-movement:
- Adjust dispenser needle to the middle of the cuvette cell 1.

Cuvette arm:
- Adjust arm that needle is in the middle of the cuvette cell 1.

Y-movement:
- Press **Z** (⇓) and find the position when the needle is touching the bottom of the cuvette.
- **Adjust 3 steps up W (⇑) from the bottom.**

Cuvette cell 12 position

Phi-movement:

- Adjust dispenser needle to the middle of the cuvette cell 12.

Y-movement:

- Press **Z** (⇓) and find the position when the needle is touching the bottom of the cuvette.
- **Adjust 3 steps up W (⇑) from the bottom.**

Save adjustments y/n?

Note!

Sample disk has four (4) circles for samples:

- **STAT (1-6)**
- **Std/Ctrl (40)**
- **Segment outer (8-14)**
- **Segment inner (1-7)**
- **(KUSTI segment rings 1 to 5)**

Dispenser has only one Y- and Phi- adjustment value for all positions in one circle.

4. STAT positions

Note!

Take sample cover off and insert 0.5 ml cups into the STAT positions.

Phi-movement:
• Adjust dispenser needle into the middle of sample cup.

Sample disk:
• Adjust disk that the needle is in the middle of the sample cup.

Y-movement:
• Press **Z** (⇓) and find the position when the needle is touching the sample cup bottom.
• **Adjust 2 steps up W (⇑) from the bottom.**

When the first STAT position has been adjusted the program asks if the user wants that all other 5 STAT positions are calculated:

Calculate other STAT positions before adjusting them? y/n
Choose *Yes.*

Check all STAT positions one by one that the needle goes to the middle of the cup without touching the cup bottom.

Save adjustments y/n?

5. Standard / Control positions

Note!

Insert 0.5 ml cups into the ISE PRIME, C10, S0 and S10 positions and place the sample disk cover and STD/CTRL plastic cover on.

Phi-movement:

- Adjust the dispenser needle into the middle of sample cup.

Sample disk:

- Adjust disk that the needle is in the middle of the sample cup.

Y-movement:

- Press **Z** (⇓) and find the position when the needle is touching the sample cup bottom.
- **Adjust 2 steps up W (⇑) from the bottom.**

When the ISE wash/prime position has been adjusted the program asks if the user wants that all other Std / Ctrl positions are calculated:

Calculate other Std / Ctrl positions before adjusting them? y/n

Choose *Yes*.

Check Std /Ctrl sample positions C10, S0 and S10 that the needle goes to the middle of the cup without touching the cup bottom.

Save adjustments y/n?

6. Segment positions

Note!

- **Take sample cover off.**
- **Insert 0.5 ml cups into the segment positions 3 and 10 and a sample tube into the position 11.**
- **Insert segment to the sample disk position 1.**
- **Insert second segment with cups in positions 3 and 10 to sample disk position 2.**

Cup position 10 adjustment:

Phi-movement:

- Adjust the dispenser needle into the middle of sample cup.

Sample disk:

- Adjust disk that the needle is in the middle of the sample cup.

Y-movement:

- Press **Z** (⇓) and find the position when the needle is touching the sample cup bottom.
- **Adjust 3 steps up W (⇑) from the bottom.**

Cup position 3 is adjusted in a similar way.

Tube bottom level in the position 11:

- Press **Z** (⇓) and find the position when the needle is touching the tube bottom.
- **Adjust as many steps up W (⇑) from the bottom as is reasonable.**

When the first segment has been adjusted the program asks if the user wants that all other 5 segment positions are calculated:

Calculate other segment positions before adjusting them? y/n
Choose Yes.

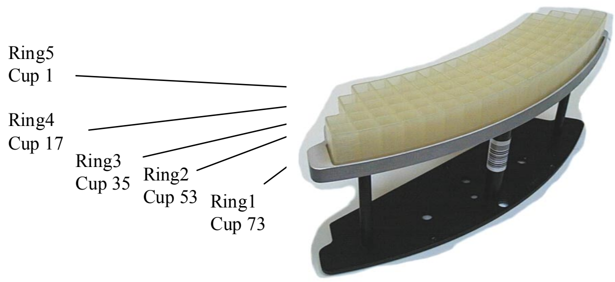
Check all segments positions 3 and 10 one by one that the needle goes into the middle of the cup without touching the cup bottom. Tube bottom level is adjusted only once in disk position 1.

Save adjustments y/n?

7. KUSTI segment positions

Note!

- **Take sample cover off and insert KUSTI segments into the sample disk position 1 and 2**



Phi-movement:

- Adjust the dispenser needle into the middle of the ring 1 cup position 73.

Sample disk:

- Adjust disk that the dispenser needle is in the middle of the ring 1 cup position 73.

Y-movement:

- Press **Z** (⇓) and find the position when the needle is touching the bottom.
- **Adjust 3 steps up W (⇑) from the bottom.**

Ring2 /cup 53 , ring3 / cup35 , ring4 / cup17 and ring5 / cup1 are adjusted in a similar way.

When all positions in the first segment has been adjusted the program asks if the user wants that all other segment positions are calculated:

Calculate other segment positions before adjusting them y/n?
Choose Yes.

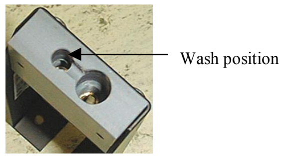
All other segment positions 2 - 6 are adjusted in a similar way.

Save adjustments y/n ?

2.1.6.4 Sample Mixer

Sample mixer adjustment positions are:

- General positions
- Cuvette positions
- Test mixing in cuvette



1. General positions

- Phi drive level position
- Paddle check position
- Manual needle wash position
- Wash position
- Resting position

Phi drive level:

- Adjust mixer paddle tip 4 - 5 mm above the sample dispensing channel where the mixer moves. (Note that mixer does not touch the wires on dispensing channel.)

Check position:

- Adjust the mixer paddle tip in the left edge of the washing station and to the top surface level of the washing station.

Manual needle wash position

Phi-movement:

- Adjust mixer paddle to the middle of the sample dispensing unit.(= 227 long steps from wash position)

Y-movement:

- Adjust mixer paddle tip 20 long steps up from surface of the washing station.

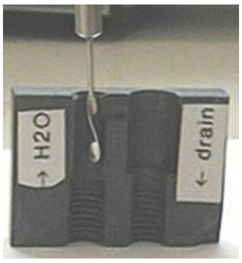
Wash position

Phi-movement:

- Adjust mixer paddle to the middle of the washing position.

Y-movement:

- Straight part of the paddle is above the washing station as shown in figure under.



Resting position:

Phi-movement:

- Adjust paddle to the middle of the wash position.

Y-movement:

- Adjust the mixer arm 1 mm above the rubber.

Save adjustments y/n?

2. Cuvette positions

- Insert a cuvette into the reagent arm if there is not already.

☛

Cuvette cell 1 position:

Phi-movement:

- Adjust the mixer paddle into the middle of the cuvette cell.

Y-movement:

- Press **Z** (⇓) and find the position when the paddle is touching the bottom of the cuvette.
- **Adjust 3 steps up W (⇑) from the bottom.**
- **Press key m to check that the mixer can rotate freely.**

☛

Cuvette cell 12 position:

Phi-movement:

- adjust the mixer paddle to the middle of the cuvette cell.

Y-movement:

- Press **Z** (⇓) and find the position when the paddle is touching the bottom of the cuvette.
- **Adjust 3 steps up W (⇑) from the bottom.**
- **Press key m to check that the mixer can rotate freely.**

Save adjustments y/n?

3. Test mixing in cuvette:

- Mixing is tested in all 12 positions in cuvette.
- **If mixing is noisy, readjust cuvette cell 1 and 12 positions.**

2.1.7 Measuring Unit

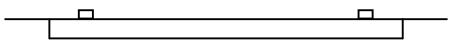
Measuring unit adjustment positions are:

- Cuvette arm
- Filter disk/ beam alignment
- Measuring positions
- Lamp voltages and gains

2.1.7.1 Cuvette Arm

Adjustment tools needed:

- A cuvette in incubator position 1
- A feeler gauge (886650)



1. Cuvette arm adjustment positions:

- Incubator positions 1, 6, 11 and 16
- Cuvette exit position

Note!

- **Cuvette arm is adjusted with incubators 4 side because it is always slightly uneven and all positions are not exactly equal from the cuvette arms point of view.**
- **Program calculates the difference between pos. 1 - 16 and uses it also with reagent and sample cuvette arms.**

Incubator position:

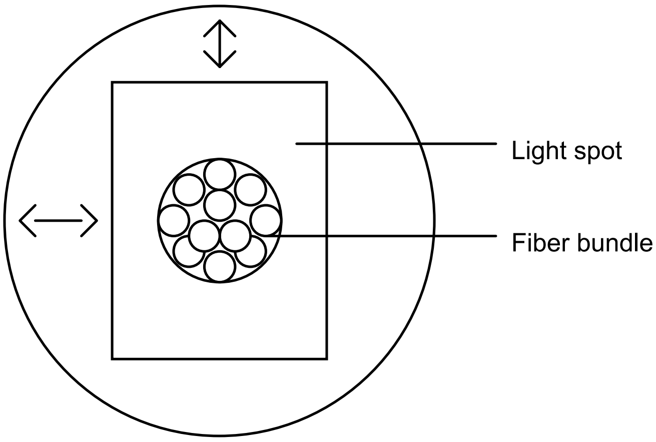
- Rotate incubator position 1 against cuvette arm. The adjustment is valid when you can hardly lift the feeler gauge (0.1 mm) from the space between the cuvette rear end and the incubator wall .
- Adjust the positions 1, 6, 11 and 16. Each position has an own adjustment value.

Cuvette exit position:

- Adjust position **4 long steps** (⇑+S) toward incubator and save adjustments.
- **Insert a cuvette to incubator position 1 and enter the Cuvette arm menu again.**
- In exit position, **press the adjustment key (A)** until you find the position where the cuvette will drop to the waste **compartment.**
- **Adjust 20 steps more (key A) from the dropping point.**
- **Save adjustments y/n?**

2.1.7.2 Filter Disk / Beam Alignment

- When filter disk / beam alignment is selected, the instrument first drives the filter wheel into its empty position (15).
- **Adjust the light spot over the fiber bundle**. (refer to figure below). Adjustment is done by the adjustment screws in the lamp assembly.



Filter wheel filter position 1

- Adjust filter wheel that the lamp beam is in the middle of the 1 filter cover.

Save adjustments y/n ?

Note!

After filter wheel adjustment procedure QC run is recommended !

2.1.7.3 *Measuring Positions*

Quit to adjustment program main menu to fetch a new cuvette to incubator position 1 (refer section 2.1.2)

Return back to Measuring unit / Measuring positions.

Measuring positions:

- Instrument adjusts positions automatically.
- Program finds cuvette cell walls starting from rear end of cuvette (=position 12) and sets the value to the middle of the cell one by one. (In software 5.0.X or lower).
- Program finds cuvette cell walls starting from front end of cuvette (=position 1) and sets the value to the middle of the cell one by one. (In software 6.0.X).
- After adjustment is seen old and new values and asked:

Save new values YES/NO.

If adjustment fails, it stops and gives an error message.

2.1.7.4 *Lamp Voltages and Gains*

The lamp voltages and gains are adjusted automatically during Start up.

Note!

Results what are seen in this function are from the latest Start up.

Gain values are: 0, 1, 2, 3, 4, 5.

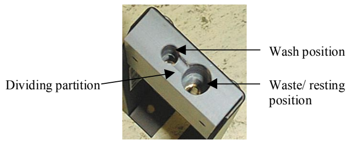
When gain is low the filter is good. With 340 and 380 the gain is usually 2 or 3. All the rest filter gains are usually 0, 1 or 2. If the gain is 5, filter or lamp is getting old or beam alignment is bad or blocked.

Note!

The lamp voltage is 0 when the filter position has a cover plate.

2.1.8 ISE Unit

ISE dispenser adjustment positions are:



1.General positions

- Phi drive level position
- Needle check position
- Manual needle wash position
- Wash position
- Resting position

4.STAT positions, all 6

5.Standard / Control positions, all 40

6.Segment positions,

- outer ring, position 10 for all 6 segments
- inner ring, position 3 for all 6 segments
- sample tube position 11 for the segment 1

7. KUSTI segment positions

8. Test wash

Note!

Sample disk has four (4) circles for samples:

- **STAT (1-6)**
- **Std /Ctrl (40)**
- **Segment outer (8-14)**
- **Segment inner (1-7)**
- **(KUSTI segment rings 1 to 5)**

ISE dispenser has only one Y- and Phi- adjustment value for all positions in one circle.

1. General positions

☛

Phi drive level position:

- Adjust dispenser needle tip 3 - 4 mm above the sample disk cover where the ISE dispenser moves.

☛

Needle check position:

- ISE needle check position is in the left edge of the washing station.
- Adjust needle tip to washing station top surface level.

☛

Manual needle wash position:

Phi-movement:

- Adjust to the middle of the washing station and reagent storage (disk).

☛

Wash position:

- Move the needle over the dividing partition.

Y-movement:

- Press **Z** (⇓) and find the position when the needle is touching the dividing partition.
- **Adjust 3 steps up W (⇑) from the partition.**

Phi-movement:

Adjust to the middle of the wash position.

☛

Waste position:

- Adjust the needle to the middle of the waste position.

Resting position:

- Adjust dispenser arm about 1 mm above the stick.
- Adjust the dispenser needle to the middle of the resting position.

Save adjustments y/n?

2. STAT positions

Note!

Take sample cover off and insert 0.5 ml cups into the STAT positions.

Phi-movement:

- Adjust dispenser needle into the middle of sample cup.

Sample disk:

- Adjust disk that the needle is in the middle of the sample cup.

Y-movement:

- Press **Z** (⇓) and find the position when the needle is touching the sample cup bottom.
- **Adjust 2 steps up W (⇑) from the bottom.**

When the STAT position 1 has been adjusted the program asks if the user wants all other 5 STAT positions to be calculated:

Calculate all STAT positions before adjusting them? y/n

Choose *Yes.*

Check all STAT sample positions one by one that the needle goes to the middle of the cup without touching the cup bottom.

Save adjustments y/n?

3. Standard / Control positions

Note!

Insert 0.5 ml cups into the ISE PRIME, C10, S0 and S10 positions and place the sample disk cover and STD/CTRL plastic cover on.

Phi-movement:

- Adjust dispenser needle into the middle of sample cup.

Sample disk:

- Adjust disk that the needle is in the middle of the sample cup.

-Y-movement:

- Press **Z** (⇓) and find the position when the needle is touching the sample cup bottom.
- **Adjust 2 steps up W (⇑) from the bottom.**

When the ISE PRIME position has been adjusted the program asks if the user wants that all other positions are calculated:

Calculate all other positions before adjusting them? y/n

Choose *Yes.*

Check STD/CTRL sample positions C10, S0 and S10 that the needle goes to the middle of the cup without touching the cup bottom.

Save adjustments y/n?

4. Segment positions

Note!

- **Take sample cover off.**
- **Insert 0.5 ml cups into the segment positions 3 and 10 and a sample tube into the position 11.**
- **Insert segment to the sample disk position 1.**
- **Insert second segment with cups in positions 3 and 10 to sample disk position 2.**

Cup position 10 adjustment:

Phi-movement:

- Adjust the dispenser needle into the middle of sample cup.

Sample disk:

- Adjust disk that the needle is in the middle of the sample cup.

Y-movement:

- Press **Z** (⇓) and find the position when the needle is touching the sample cup bottom.
- **Adjust 2 steps up W (⇑) from the bottom.**

Cup position 3 is adjusted in a similar way.

Tube bottom level in the position 11:

- Press **Z** (⇓) and find the position when the needle is touching the tube bottom.
- **Adjust as many steps up W (⇑) from the bottom as is reasonable.**

When positions in the first segment has been adjusted, the program asks if the user wants that all other positions are calculated:

Calculate all other positions before adjusting them? y/n

Choose *Yes.*

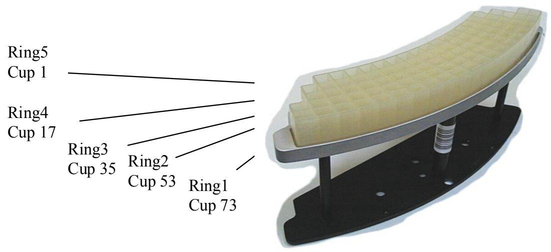
Check all segments positions 3 and 10 one by one that the needle goes into the middle of the cup without touching the cup bottom. Tube bottom level is adjusted only once in segment 1.

Save adjustments y/n?

7. KUSTI segment positions

Note!

Take sample cover off and insert KUSTI segments into the sample disk positions 1 and 2.



Phi-movement:

- Adjust the ISE dispenser needle into the middle of the ring 1 cup position 73.

Sample disk:

- Adjust disk that the ISE dispenser needle is in the middle of the ring 1 cup position 73.

Y-movement:

- Press **Z** (⇓) and find the position when the needle is touching the bottom.
- **Adjust 3 steps up W(⇑) from the bottom.**

Ring2 /cup 53 , ring3 / cup35 , ring4 / cup17 and ring5 / cup1 are adjusted in a similar way.

When all positions in the first segment has been adjusted the program asks if the user wants that all other segment positions are calculated:

Calculate other segment positions before adjusting them y/n?

Choose *Yes.*

All other segment positions 2 - 6 are adjusted in a similar way.

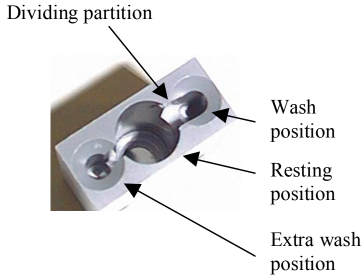
Save adjustments y/n?

2.1.9 KUSTI Unit

KUSTI dispenser adjustment positions are:

1. General positions

- Phi drive level position
- Needle check position
- Manual needle wash position
- Wash position
- Extra wash position
- Resting position



2. Sample transfer line position
7. KUSTI segment positions
8. Test wash

1. General positions

Phi drive level:

- Adjust dispenser needle tip 2 - 3 mm above the sample disk cover where the KUSTI dispenser moves.

Needle check position:

- The needle check position is in the right edge of the washing station.
- Adjust the needle tip to the washing station top surface level.

Manual needle wash position:

Phi-movement:
- Adjust the needle over the bottle of washing solution

F Wash position:

• Move the needle over the dividing partition.

Y-movement:

• Press **Z** (⇓) and find the position when the needle is touching the dividing partition.

• **Adjust 3 steps up W (⇑) from the partition**

Phi-movement:

• Adjust to the middle of the wash position.

Extra wash position:

Phi movement:

• Adjust to the middle of the extra wash position. Wash position Y-movement adj. value is used in Extra wash position.

Resting position:

• Dispenser arm is adjusted 1mm above the rubber .

• Adjust the Phi-movement to the left side of washing station.

Save adjustments y/n?

2. Sample transfer line position:

Note!

This adjustment is done after connecting Konelab to Sample transfer line. Factory adjustment is over the left end cover.

KUSTI dispenser sample transfer line position:

Phi-movement:

- Adjust KUSTI dispenser needle into the middle of the sample tube in the sample transfer line. Y-movement is not saved.

This adjustment is made first to move dispenser over the sample transfer line without any danger of breaking the needle.

KUSTI dispenser sample transfer line position:

Phi-movement:

- Adjust KUSTI dispenser needle into the middle of the sample tube in the sample transfer line.

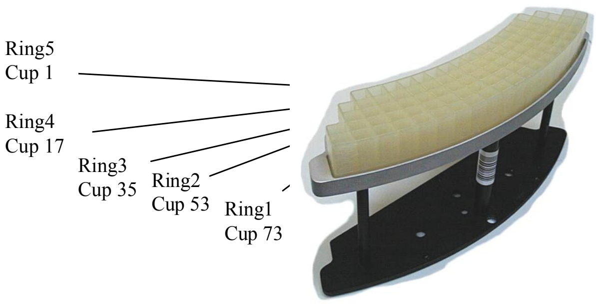
Y-movement:

- Press **Z** (⇓) and find the position when the needle is touching the tube bottom.
- **Adjust as many steps up W (⇑) from the bottom as is reasonable.**

3. KUSTI segment positions:

Note!

Take sample cover off and insert KUSTI segments into the sample disk positions 1 and 2.



Phi-movement:

- Adjust the KUSTI dispenser needle into the middle of the ring 1 cup position 73.

Sample disk:

- Adjust disk that the KUSTI dispenser needle is in the middle of the ring 1 cup position 73.

Y-movement:

- Adjust dispenser needle halfway to the cup.

Ring2 /cup 53 , ring3 / cup35 , ring4 / cup17 and ring5 / cup1 are adjusted in a similar way.

When all positions in the first segment has been adjusted the program asks if the user wants that all other segment positions are calculated:

Calculate other segment positions before adjusting them y/n?

Choose *Yes.*

All other segments 2 - 6 are adjusted in a similar way.

Save adjustments y/n?

2.1.10 Syringe Zero Position

Syringe zero position adjustment must be done when complete syringe unit, stepper motor or opto has been changed.

The instrument adjusts the zero position automatically.

Error message 5065 "Syringes should be adjusted (adjustment program)" informs the user when syringe zero position adjustment should be done.

2.1.11 Saving and Restoring Adjustment Values

2.1.11.1 Saving Adj. Values to Floppy Disk

1. Connect display and keyboard to the internal PC.
2. **If instrument is on** - quit Konelab software by **pressing E**.
   - **If instrument is off** - boot the instrument. Select item **2. Command prompt** from boot up menu by pressing the arrow key down (⇓) once and after that pressing enter.
3. Insert **formatted** floppy disk to the floppy drive. Note! The floppy drive is upside down.
4. When in the screen is displayed **C://x60**, copy adjustment files to the floppy disk with command **save_adj.**
5. Remove the floppy disk from the drive.
6. Reboot the instrument.

2.1.11.2 Restoring Adj. Values from Floppy Disk

1. Connect display and keyboard to the internal PC.
2. **Instrument is on** - quit Konelab software by **pressing E**.
   - **Instrument is off** - boot the instrument. Select item **2. Command prompt** from boot up menu by pressing the arrow key down (⇓) once and after that pressing enter.
3. Insert the floppy disk **containing the adjustment values** to the floppy drive. Note: Floppy drive is upside down.
4. When in the screen is displayed **C://x60**, load adjustment files from the floppy disk with command **load_adj**
5. Remove the floppy disk from the drive.
6. Reboot the instrument.

2.2 Adjustments of Konelab 30

2.2.1 General

Note!
Keep CapsLock OFF when adjusting

Keys in use	Alternative keys	Function
1 - 9		Module selection
Y/N	ALT+89/ ALT+78	To save / cancel changes
N	ALT+78	Next
I	ALT+73	Initialisation
R	ALT+82	To restore old adjustment
A <-> **S**	ALT+97 – ALT+115	**1. Motor, Left** <-> **Right movement**
Shift + **A** <-> **S**	A+65 – ALT+83	Left - Right with a long movement
W <-> **Z**	ALT+119 – ALT+122	**2. Motor, Up** <-> **Down movement**
Shift + **W** <-> **Z**	ALT+87 – ALT+90	Up-Down with a long movement
C <-> **V**	ALT+99 – ALT+118	**3. Motor, Forward** <-> **Backward**
Shift + **C** <-> **V**	ALT+67 – ALT+86	Forward - Backward with a long movement
b	ALT+98	To read barcode in the reagent disk / sample disk. (In the sample disk, the segment barcode is read.)
B	ALT+66	In the sample disk, segment and tube barcodes are read.
T	ALT+84	Automatic BCR reading position adjustment
M	ALT+77	To rotate mixer when adjusting mixer cuvette positions
Q	ALT+81	Quit

Note!

During adjustment program, sample / reagent covers can be taken off. In that time the analyser is not responding to the opening of covers.

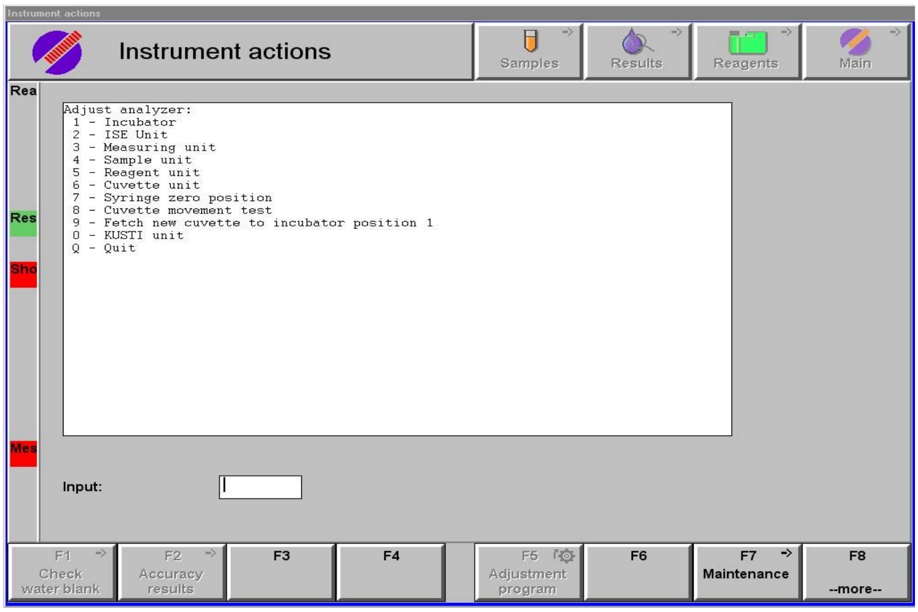
Attach the covers back before quitting the adjustment program.

Note!

After each maintenance or adjustment procedure QC run is recommended !

2.2.2 How to Start Adjusting ?

- Open Konelab user interface:
- Click Main -button
- Press F8 -key (More)
- Press F2 -key (Instr. Actions)
- Press F8 (More)
- Press F5 (Adjustment program)



Recommended order to adjust

- Incubator
- Cuvette unit
- Reagent disk
- Sample disk
- Measuring unit
- Dispensing unit
- ISE unit
- KUSTI unit

Good to know

- The instrument adjusts **'Syringe zero position'** automatically. (refer section 2.2.9)
- **'Fetch new cuvette to incubator position'** is recommended to use when a cuvette has to be moved to the selected incubator position. (E.g. for adjustment of measuring positions in measuring unit (refer section 2.2.6.3))

Note!

After each adjustment section program asks:

"Save adjustments (y/n) ?"

Press key Y (yes) to save adjustments automatically to internal PC hard disk.

Dispenser needles / Mixer paddle

- Before the adjustment of dispensers and mixer, the arms of them have to be adjusted mechanically so that dispenser needles go to their checking points. Refer to checking points under.

Needle checking points are the following:

Dispenser	The right edge of the sample side's washing station.
ISE dispenser	The left edge of the washing station.
KUSTI dispenser	The right edge of the washing station.
Mixer	The left edge of the washing station.

2.2.3 Incubator

Adjustment tools needed:

- a cuvette in every incubator position 1-6
- take plastic cover, incubator metal cover and black measuring channel cover off.

Note!

Cuvette arm is powerless during incubator adjustment.

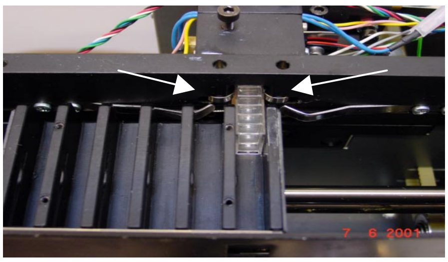
It can be moved manually.

Incubator adjustment positions are:

- Cuvette arm positions

Cuvette arm position 1:

- Fetch manually cuvette with arm from incubator and check that the cuvette is not touching guiding bearings.
- Adjust incubator if needed .
- Release cuvette back to incubator and fetch again.



Other Cuvette arm positions 2-6 are adjusted in a similar way.

- **Save adjustments y/n?**

2.2.4 Cuvette Unit

Cuvette unit adjustment positions are:

- Pusher open position
- Pusher position for cuvette fetch

Note!

Cuvette feeder must be empty!

Pusher open position:

- Pusher belt gear and the loader end belt gear nearly touch each other.
- Adjust pusher if needed.
- Press pusher with fingers to see more clearly adjustment movement.

Note!

Insert one (1) cuvette into the feeder when command is seen on the screen.

Pusher position for cuvette fetch:

- First the program will automatically adjust the distance to cuvette sensing opto.
- **For example:** On the screen is seen text: "Adjusting pusher position for cuvette fetch, opto detected at -54947". Compare opto value to adjustment value **and adjust 4-6 steps more from detection point**. Adjustment value must be bigger.
- **Fetch a cuvette manually from feeder and check that cuvette aligns straight with cuvette arm. Readjust pusher if needed.**
- Press pusher down to see more clearly adjustment movement.
- **Save adjustments y/n?**

2.2.5 Reagent Disk

Adjustment tools needed:

- Empty barcoded 20 ml reagent bottle.

Reagent disk adjustment positions are:

- Vial inserting position
- Barcode reader position

Vial inserting position:

- Open vial / inserting cover and insert a reagent bottle to disk.
- Adjust reagent disk if needed.

Barcode reader position:

- Press **b** to read the reagent bottle barcode.
- If reading is OK, no beep is heard. By adjusting the disk, find the both ends of the reading area until beep sound is heard. Count the steps from side to side and set the adjustment to the middle.
- **Save adjustments y/n?**

2.2.6 Sample Disk

Sample disk adjustments are:

- Segment / vial inserting position, segments 1-6
- Barcode reader position, segments 1-6
- STAT sample inserting, positions 1-6
- Barcode reader position, STAT samples 1-6
- Segment loader positions

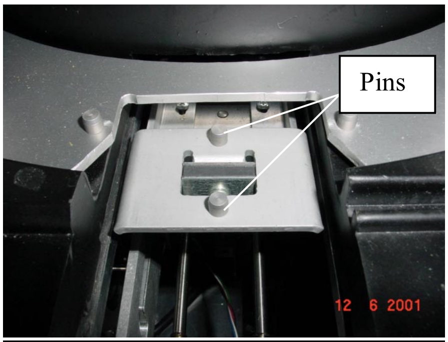
Note!

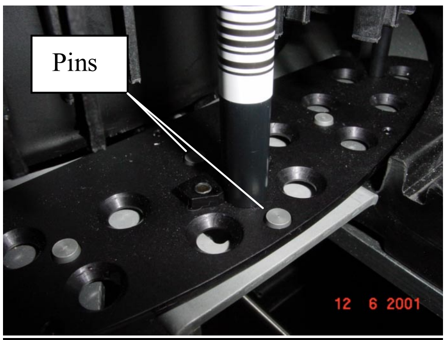
Segment loader is powerless during adjustment. It can be moved manually. Be sure that loader is not blocking sample disk movement when entering next position.

Take sample cover off.

Segment / vial inserting position segment position 1:

- Move the segment loader to down position
- Adjust the disk that segment is in correct position when loader lifts it out.
- Check movement manually that segment loader´s 2 pins goes straight through segment´s bottom plate holes.





Barcode reader position segment position 1:

- Insert a segment with barcoded sample tubes into the sample disk position 1.
- **Press b to read the segment barcode**. If reading is OK, no beep is heard. By adjusting the disk, find the both ends of the reading area until beep sound is heard. Count the steps from side to side and set the adjustment to the middle.

Note!

Good quality barcode stickers are needed.

Automatic BCR adjustment:

- After the segment barcode reading position is adjusted, the analyser will adjust the barcode reading positions automatically for all sample tubes. **Press T to start adjustment.**
- When the automatic adjustment has been made, new and old values are seen on the screen and asked: *Save new values y/n?*
- You can check the segment and tube barcode readings. **Press B (Shift + b)**.
- When the first segment has been adjusted the program asks if the user wants that all other 5 segment positions are calculated: *Calculate other segment positions before adjusting them? y/n* **Choose Yes**.

Note! All other positions (2-6) are adjusted in a similar way.

- **Save adjustments y/n?**

STAT sample inserting position:

- With cover on, insert a sample tube into the STAT sample position 1.
- Adjust disk if needed.

Barcode reader position:

- Insert barcoded sample tube into the STAT sample position 1.
- **Press b to read the sample tube barcode**. If reading is OK, no beep is heard. By adjusting the disk, find the both ends of the reading area until beep sound is heard. Count the steps from side to side and set the adjustment to the middle.
- When the STAT sample position 1 has been adjusted, the program asks if the user wants that all other 5 STAT sample positions are calculated: *Calculate other STAT positions before adjusting them? y/n.* **Choose Yes**.

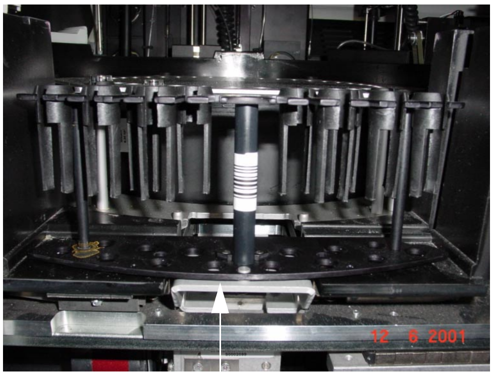
STAT sample inserting / barcode positions 2-6 are adjusted in a similar way.

- **Save adjustments y/n?**

Segment loader positions:

Segment loader up position:

- Segment must rest over the sample unit, not over the segment loader. Adjust about 1 mm space between the segment bottom and loader.



1 mm space between segment and loader

Important!

Sample disk position 1 must be empty. Close the segment loader cover before next (n) position.

Segment loader positions

Segment loader down position:

- Adjust the loader that the sample disk can rotate freely without touching the segment loader pins.
- Distance between sample disk bottom and loader pins is 2-3mm. **DO NOT** adjust it lower because the loaders mechanical movement area ends.
- **Save adjustments y/n?**

2.2.7 Measuring Unit

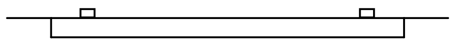
Measuring unit adjustment positions are:

- Cuvette arm
- Filter disk/ beam alignment
- Measuring positions
- Lamp voltages and gains

2.2.7.1 Cuvette Arm

Adjustment tools needed:

- a cuvette without hook in loader, incubator pos. 1 and 6.
- a feeler gauge (886650)



1. Cuvette arm adjustment positions:

- Loader position
- Incubator position
- Cuvette exit position

Cuvette loader position:

- Insert a cuvette without hook to the loader. The adjustment is valid when you can hardly move the feeler gauge (0.1mm) from the space between the cuvette rear end and the loader wall.

Incubator position:

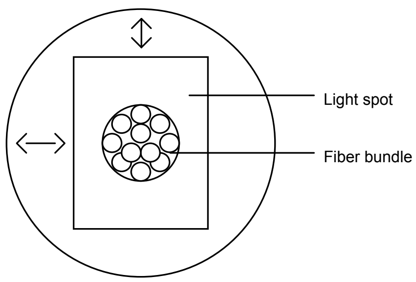
- The adjustment is valid when you can hardly move the feeler gauge (0.1 mm) from the space between the cuvette rear end and the incubator wall.

Cuvette exit position:

- **Adjust position 4 long steps** (⇑**+S**) toward incubator and save adjustments.
- **Remove cuvettes without hook from loader incubator positions 1 and 6.**
- **Insert cuvette to incubator position 1 and enter the Cuvette arm menu**. In exit position, **press the adjustment key (A)** until you find the position where the cuvette will drop to the waste compartment.
- **Adjust 30 steps more (key A) or 3 long steps (shift ⇑+A) from the dropping point.**

2.2.7.2 Filter Disk / Beam Alignment

- **When filter disk / beam alignment is selected, the instrument first drives the filter wheel into its empty position (15).**
- **Adjust the light spot over the fiber bundle**. (refer to figure below). Adjustment is done by the adjustment screws in the lamp assembly.



Filter wheel filter position 1

- Adjust filter wheel that the lamp beam is in the middle of the 1 filter cover.

Note!

After filter wheel adjustment procedure QC run is recommended !

2.2.7.3 Measuring Positions

Quit to adjustment program main menu to fetch a new cuvette to incubator position 1 (refer section 2.2.2)

Return back to measuring unit / Measuring positions.

Measuring positions:

- Instrument adjusts positions automatically.
- Program finds cuvette cell walls starting from rear end of cuvette (=position 12) and sets the value to the middle of the cell one by one. (In software 5.0.X or lower).
- Program finds cuvette cell walls starting from front end of cuvette (=position 1) and sets the value to the middle of the cell one by one. (In software 6.0.X).
- After adjustment is seen old and new values and asked: Save new values YES/NO. If adjustment fails, it stops and gives an error message.

2.2.7.4 Lamp Voltages and Gains

The lamp voltages and gains are adjusted automatically during Start up.

Note!

Results what are seen in this function are from the latest Start up.

Gain values are: 0, 1, 2, 3, 4, 5.

When gain is low the filter is good. With 340 and 380 the gain is usually 2 or 3. All the rest filter gains are usually 0, 1 or 2. If the gain is 5, filter or lamp is getting old or beam alignment is bad or blocked.

Note!

The lamp voltage is 0 when the filter position has a cover plate.

2.2.8 Dispensing Unit

2.2.8.1 Dispenser

Dispenser adjustment positions are:

1. General positions
- Phi drive level position
- Needle check position
- Manual needle wash position
- Wash position
- Extra wash position
- Resting position
- Reagent wash position
- Reagent extra wash position

2. Cuvette positions
3. Reagent positions
4. STAT positions, all 6
5. Standard / Control positions, all 40
6. Segment positions
- Outer ring, position 10 for all 6 segments
- Inner ring, position 3 for all 6 segments
- Sample tube in position 11 for the segment position 1

7. KUSTI segment positions
8. Test wash

1. General positions

☛ **Phi drive level position:**

- Adjust dispenser needle tip 2 - 3 mm above the cuvette loader / incubator cover, where the dispenser moves.

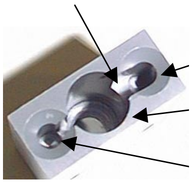
☛ **Needle check position:**

- The needle check position is over the right edge of the sample side washing station. Adjust the needle tip to the washing station top surface level.

Manual needle wash position:

Phi-movement:

• Adjust needle to the middle of the resting position.



Wash position:

• Move the needle over the dividing partition.

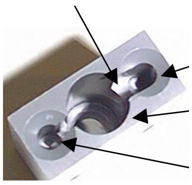
Y-movement:

• Press Z (⇓) and find the position when the needle is touching the dividing partition.

• **Adjust 3 steps up W (⇑) from the partition.**

Phi-movement:

• Adjust back to the middle of the wash position



Extra wash position:

Phi movement:

• Adjust to the middle of the extra wash position. Wash position Y-movement adj. value is used in Extra wash position.

Resting position:

• Dispenser arm is adjusted about 1 mm above the stick. Adjust the Phi-movement to the middle of the resting position.

Reagent wash positions:

• Move the needle over the dividing partition.

Y-movement:

• Press Z (⇓) and find the position when the needle is touching the dividing partition. **Adjust 3 steps up W (⇑) from the partition.**

Phi-movement:

• Adjust back to the middle of the wash position.

Reagent extra wash position:

Phi movement:

• Adjust to the middle of the extra wash position.

• Wash position Y-movement adj. value is used in Extra wash position.

• Save adjustments y/n?

• Test washing positions by choosing the point 8 - Test wash.

2. Cuvette positions

• Cuvette cell 1 upper position
• Cuvette cell 1 position
• Cuvette cell 12 position

Adjustment tools needed:

• cuvettes in incubator positions 1 and 6. (Use function **9: Fetch new cuvette to incubator** instead of putting cuvettes manually into positions.)

Note!
Incubator is adjusted only in positions:
cuvette cell 1 upper,
cuvette cell 1

Cuvette cell 1 upper position
(Incubator position 1)

Phi-movement:
• Adjust dispenser needle to the middle of the cuvette cell 1.

Incubator:
• Adjust incubator that needle is in the middle of the cuvette cell 1.

Y-movement:
• Adjust the needle tip **1 mm under** the cuvette top surface.

Cuvette cell 1 position
(Incubator position 1)

Phi-movement:
• Adjust dispenser needle to the middle of the cuvette cell 1.

Incubator:
• Adjust incubator that needle is in the middle of the cuvette cell 1.

Y-movement:
• Press Z (⇓) and find the position when the needle is touching the bottom of the cuvette.
• **Adjust 3 steps up W (⇑) from the bottom.**

☛

Cuvette cell 12 position
(Incubator position 1)

Phi-movement:

• Adjust dispenser needle to the middle of the cuvette cell 12.

Y-movement:

• Press Z (⇓) and find the position when the needle is touching the bottom of the cuvette.

• **Adjust 3 steps up W (⇑) from the bottom.**

When the cuvette cell positions 1 and 12 have been adjusted, the program asks if the user wants all other positions to be calculated before adjustment:

Calculate middle cuvette positions before adjusting them? y/n

Choose *Yes*.

Positions 2 to 11 can be adjusted separately.

Cuvette cell positions in incubator position 6 are adjusted in a similar way.

Save adjustments y/n.

3. Reagent positions

Note!

- **Take reagent cover off.**
- **Insert 20ml reagent bottles into the reagent plate positions 1, 12, 23 and 35.**
- **Each reagent bottle position has an own bottom adjustment value.**

Reagent disk position cups

Phi-movement:

- Adjust dispenser needle to middle of the bottle neck.

Reagent disk:

- Adjust disk so that the needle is in middle of the bottle neck.

Y-movement:

- Press Z (⇓) to find the position when the needle is touching the bottom of the bottle.
- **Adjust 4 steps up W (⇑) from the bottom.**

Positions 12, 23 and 35:

- Check Y-movement 4 steps up from the bottom.

Save adjustments y/n?

Note!

Sample disk has four (4) types of circles for samples:

- **STAT (1-6)**
- **Cal/Ctrl (40)**
- **Segment outer (7-14)**
- **Segment inner (1-6)**
- **(KUSTI segment rings 1 to 5)**

Dispenser has only one Y- and Phi- adjustment value for all positions in one circle.

4. STAT positions

Note!

Take sample cover off and insert 0.5ml cups into the STAT positions.

Phi-movement:

• Adjust dispenser needle to the middle of sample cup.

Sample disk:

• Adjust disk so that the needle is in the middle of the sample cup.

Y-movement:

• Press Z (⇓) to find the position when the needle is touching the sample cup bottom.

• **Adjust 2 steps up W (⇑) from the bottom.**

When the first STAT position has been adjusted the program asks if the user wants all other 5 STAT positions to be calculated:

Calculate other STAT positions before adjusting them? y/n

Choose *Yes.*

Check all STAT positions one by one that the needle goes to the middle of the cup without touching the cup bottom.

Save adjustments y/n?

5. Standard / Control positions

Note!

Insert 0.5ml cups into the ISE PRIME, C10, S0 and S10 positions and place the sample disk cover and STD/CTRL plastic cover on.

Phi-movement:

- Adjust the dispenser needle to the middle of sample cup.

Sample disk:

- Adjust disk so that the needle is in the middle of the sample cup.

Y-movement:

- Press **Z** (⇓) to find the position where the needle is touching the sample cup bottom.
- **Adjust 2 steps up W (⇑) from the bottom.**

When the ISE wash/prime position has been adjusted the program asks if the user wants all other Std / Ctrl positions to be calculated:

Calculate other Std / Ctrl positions before adjusting them? y/n

Choose *Yes.*

Check in Std /Ctrl sample positions C10, S0 and S10 the needle goes into the middle of the cup without touching the cup bottom.

Save adjustments y/n?

6. Segment positions

Note!

- **Take sample cover off.**
- **Insert 0.5ml cups into the segment positions 3 and 10 and a sample tube into the position 11.**
- **Insert segment to the sample disk position 1.**
- **Insert second segment with cups in positions 3 and 10 to sample disk position 2.**

Cup position 10 adjustment:

Phi-movement:

- Adjust the dispenser needle into the middle of sample cup.

Sample disk:

- Adjust disk that the needle is in the middle of the sample cup.

Y-movement:

- Press **Z** (⇓) and find the position when the needle is touching the sample cup bottom.
- **Adjust 3 steps up W (⇑) from the bottom.**

Cup position 3 is adjusted in a similar way.

Tube bottom level in the position 11:

- Press Z (⇓) and find the position when the needle is touching the tube bottom.
- **Adjust as many steps up W (⇑) from the bottom as is reasonable.**

When the first segment has been adjusted the program asks if the user wants that all other 5 segment positions are calculated:

Calculate other segment positions before adjusting them? y/n

Choose *Yes*.

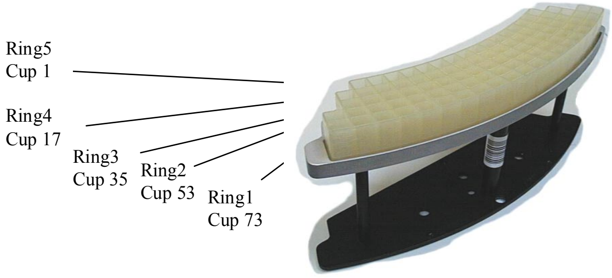
Check all segments positions 3 and 10 one by one that the needle goes into the middle of the cup without touching the cup bottom. **Tube bottom level is adjusted only once in disk position 1.**

Save adjustments y/n?

7. KUSTI segment positions

Note!

• Take sample cover off and insert KUSTI segments into the sample disk position 1 and 2



Phi-movement:

• Adjust the dispenser needle into the middle of the ring 1 cup position 73.

Sample disk:

• Adjust disk that the dispenser needle is in the middle of the ring 1 cup position 73.

Y-movement:

• Press **Z** (⇓) and find the position when the needle is touching the bottom.

• Adjust 3 steps up W (⇑) from the bottom.

Ring2 /cup 53 , ring3 / cup35 , ring4 / cup17 and ring5 / cup1 are adjusted in a similar way.

When all positions in the first segment has been adjusted the program asks if the user wants that all other segment positions are calculated:

Calculate other segment positions before adjusting them y/n?

Choose *Yes*.

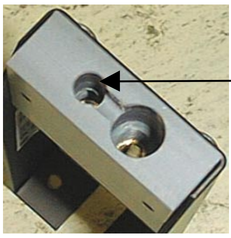
All other segment positions 2 - 6 are adjusted in a similar way.

Save adjustments y/n?

2.2.8.2 Mixer

Sample mixer adjustment positions are:

- General positions
- Cuvette positions
- Test mixing in cuvette



Wash position

1. General positions

Phi drive level:
- Adjust mixer paddle tip 4 - 5 mm above the measuring channel black plastic cover, where the mixer moves.

Check position:
- Adjust the mixer paddle tip in the left edge of the washing station and to the top surface level of the washing station.

Manual needle wash position:

Phi-movement:
- Adjust mixer paddle over the measuring channel.

Y-movement:
- Adjust mixer paddle tip 20 long steps above the surface of washing station

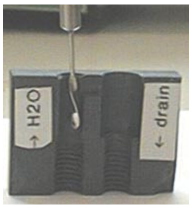
Wash position:

Phi-movement:

- Adjust mixer paddle to the middle of the washing position.

Y-movement:

- Adjust straight part of the paddle above the washing station as shown in figure below:



Resting position:

Phi-movement:

- Adjust paddle to the middle of the wash position.

Y-movement:

- Adjust the mixer arm 1 mm above the stick.

Save adjustments y/n?

2. Cuvette positions

Adjustment tools needed:

• Cuvettes in incubator positions 1 and 6.

Cuvette cell 1position:

Phi-movement:
• Adjust the mixer paddle to the middle of the cuvette cell.
Incubator:
• Adjust incubator so that paddle is in the middle of the cuvette cell.
Y-movement:
• Press **Z** (⇓) to find the position where the paddle is touching the bottom of the cuvette.
• Adjust 3 steps up W (⇑) from the bottom.
• Press m button to check the mixing.

Cuvette cell 12 position:

Phi-movement:
• adjust the mixer paddle to the middle of the cuvette cell.
Y-movement:
• Press **Z** (⇓) and find the position when the paddle is touching the bottom of the cuvette.
• Adjust 3 steps up W (⇑) from the bottom.
• Press m button to check the mixing.

After adjustment program asks if the user wants other positions to be calculated:

Calculate middle cuvette positions before adjusting them y/n?

Choose *Yes*.

Positions 2 to 11can be adjusted separately.

Cuvette positions in incubator position 6 is adjusted in a similar way.

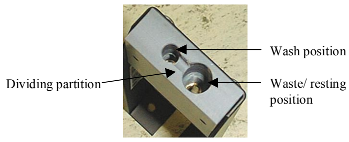
Save adjustments y/n?

9. Test mixing in cuvette:

• Test mixing in all 12 cell positions in incubator positions 1 and 6.
• If mixing is noisy, readjust Phi-position.

2.2.9 ISE Unit

ISE dispenser adjustment positions are:



1.General positions

- Phi drive level position
- Needle check position
- Manual needle wash position
- Wash position
- Resting position

2.STAT positions, all 6

3.Standard / Control positions, all 40

4.Segment positions,

- outer ring, position 10 for all 6 segments
- inner ring, position 3 for all 6 segments
- sample tube position 11 for the segment 1

7. KUSTI segment positions

8. Test wash

Note!

Sample disk has four (4) circles for samples:

- **-STAT (1-6)**
- **-Std /Ctrl (40)**
- **-Segment outer (8-14)**
- **-Segment inner (1-7)**

(KUSTI segment rings 1 to 5)

ISE dispenser has only one Y- and Phi- adjustment value for all positions in one circle.

1. General positions

Phi drive level position:

- Adjust dispenser needle tip 3 - 4 mm above the sample disk cover where the ISE dispenser moves.

Needle check position:

- ISE needle check position is in the left edge of the washing station. Adjust needle tip to washing station top surface level.

Manual needle wash position:

Phi-movement:

- Adjust to middle of the washing station and and sample storage

Wash position:

- Move the needle over the dividing partition.

Y-movement:

- Press **Z** (⇓) and find the position when the needle is touching the dividing partition.
- **Adjust 3 steps up W (⇑) from the partition.**

Phi-movement:

- Adjust to the middle of the wash position.

Waste position:

- Adjust the needle to the middle of the waste position.

Resting position:

- Adjust dispenser arm about 1 mm above the stick.
- Adjust the dispenser needle to the middle of the resting position.

Save adjustments y/n?

2. STAT positions

Note!

Take sample cover off and insert 0.5ml cups into the STAT positions.

Phi-movement:

- Adjust dispenser needle into the middle of sample cup.

Sample disk:

- Adjust disk that the needle is in the middle of the sample cup.

Y-movement:

- Press **Z** (⇓) and find the position when the needle is touching the sample cup bottom.
- **Adjust 2 steps up W (⇑) from the bottom.**

When the STAT position 1 has been adjusted the program asks if the user wants that all other 5 STAT positions are calculated:

Calculate all STAT positions before adjusting them? y/n

Choose *Yes.*

Check all STAT sample positions one by one that the needle goes to the middle of the cup without touching the cup bottom.

Save adjustments y/n?

3. Standard / Control positions

Note!

Insert 0.5ml cups into the ISE PRIME, C10, S0 and S10 positions and place the sample disk cover and STD/CTRL plastic cover on.

Phi-movement:

- Adjust dispenser needle into the middle of sample cup.

Sample disk:

- Adjust disk that the needle is in the middle of the sample cup.

-Y-movement:

- Press Z (⇓) and find the position when the needle is touching the sample cup bottom.
- **Adjust 2 steps up W (⇑) from the bottom.**

When the ISE PRIME position has been adjusted the program asks if the user wants that all other positions are calculated:

Calculate all other positions before adjusting them? y/n

Choose *Yes.*

Check STD/CTRL sample positions C10, S0 and S10 that the needle goes to the middle of the cup without touching the cup bottom.

Save adjustments y/n?

4. Segment positions

Note!

- **Take sample cover off.**
- **Insert 0.5ml cups into the segment positions 3 and 10 and a sample tube into the position 11.**
- **Insert segment to the sample disk position 1.**
- **Insert second segment with cups in positions 3 and 10 to sample disk position 2.**

Cup position 10 adjustment:

-Phi-movement:

- Adjust the dispenser needle into the middle of sample cup.

Sample disk:

- Adjust disk that the needle is in the middle of the sample cup.

Y-movement:

- Press **Z** (⇓) and find the position when the needle is touching the sample cup bottom.
- **Adjust 2 steps up W (⇑) from the bottom.**

Cup position 3 is adjusted in a similar way.

Tube bottom level in the position 11:

- Press **Z** (⇓) and find the position when the needle is touching the tube bottom.
- **Adjust as many steps up W (⇑) from the bottom as is reasonable.**

When positions in the first segment has been adjusted, the program asks if the user wants that all other positions are calculated:

Calculate all other positions before adjusting them? y/n

Choose *Yes.*

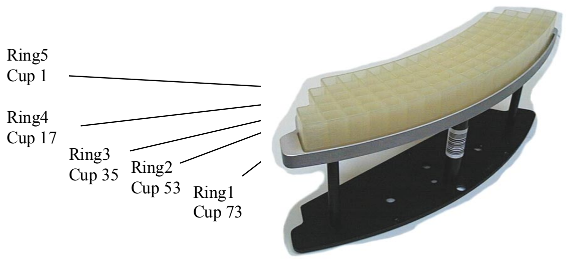
Check all segments positions 3 and 10 one by one that the needle goes into the middle of the cup without touching the cup bottom. Tube bottom level is adjusted only once in segment 1.

Save adjustments y/n?

7. KUSTI segment positions

Note!

Take sample cover off and insert KUSTI segments into the sample disk positions 1 and 2.



Phi-movement:

- Adjust the ISE dispenser needle into the middle of the ring 1 cup position 73.

Sample disk:

- Adjust disk that the ISE dispenser needle is in the middle of the ring 1 cup position 73.

Y-movement:

- Press **Z** (⇓) and find the position when the needle is touching the bottom.
- **Adjust 3 steps up W(⇑) from the bottom.**

Ring2 /cup 53 , ring3 / cup35 , ring4 / cup17 and ring5 / cup1 are adjusted in a similar way.

When all positions in the first segment has been adjusted the program asks if the user wants that all other segment positions are calculated:

Calculate other segment positions before adjusting them y/n?

Choose *Yes.*

All other segment positions 2 - 6 are adjusted in a similar way.

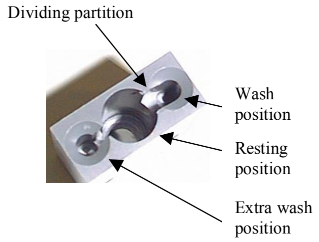
Save adjustments y/n?

2.2.10 KUSTI Unit

KUSTI dispenser adjustment positions are:

1. General positions
- Phi drive level position
- Needle check position
- Manual needle wash position
- Wash position
- Extra wash position
- Resting position

2. Sample transfer line position
8. KUSTI segment positions
9. Test wash



1. General positions

Phi drive level:

- Adjust dispenser needle tip 2 - 3 mm above the sample disk cover where the KUSTI dispenser moves.

Needle check position:

- The needle check position is in the right edge of the washing station.
- Adjust the needle tip to the washing station top surface level.

Manual needle wash position:

Phi-movement:
- Adjust the needle over the bottle of washing solution.

F Wash position:

- Move the needle over the dividing partition.

Y-movement:

- Press **Z** (⇓) and find the position when the needle is touching the dividing partition.
- **Adjust 3 steps up W (⇑) from the partition**

Phi-movement:

- Adjust to the middle of the wash position.

Extra wash position:

Phi movement:

- Adjust to the middle of the extra wash position. Wash position Y-movement adj. value is used in Extra wash position.

Resting position:

- Dispenser arm is adjusted 1mm above the rubber .
- Adjust the Phi-movement to the left side of washing station.

Save adjustments y/n?

2. Sample transfer line position:

Note!

This adjustment is done after connecting Konelab to Sample transfer line. Factory adjustment is over the left end cover.

KUSTI dispenser sample transfer line position:

Phi-movement:

- Adjust KUSTI dispenser needle into the middle of the sample tube in the sample transfer line. Y-movement is not saved.

This adjustment is made first to move dispenser over the sample transfer line without any danger of braking the needle.

KUSTI dispenser sample transfer line position:

Phi-movement:

- Adjust KUSTI dispenser needle into the middle of the sample tube in the sample transfer line.

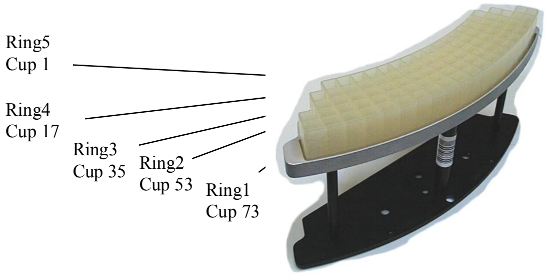
Y-movement:

- Press **Z** (⇓) and find the position when the needle is touching the tube bottom.
- **Adjust as many steps up W (⇑) from the bottom as is reasonable.**

8. KUSTI segment positions:

Note!

Take sample cover off and insert KUSTI segments into the sample disk positions 1 and 2.



Phi-movement:

- Adjust the KUSTI dispenser needle into the middle of the ring 1 cup position 73.

Sample disk:

- Adjust disk that the KUSTI dispenser needle is in the middle of the ring 1 cup position 73.

Y-movement:

- Adjust dispenser needle halfway to the cup.

Ring2 /cup 53 , ring3 / cup35 , ring4 / cup17 and ring5 / cup1 are adjusted in a similar way.

When all positions in the first segment has been adjusted the program asks if the user wants that all other segment positions are calculated:

Calculate other segment positions before adjusting them y/n?

Choose *Yes.*

All other segments 2 - 6 are adjusted in a similar way.

Save adjustments y/n?

2.2.11 Syringe Zero Position

Syringe zero position adjustment must be done when complete syringe unit, stepper motor or opto has been changed.

The instrument adjusts the zero position automatically.

Error message 5065 "Syringes should be adjusted (adjustment program)" informs the user when syringe zero position adjustment should be done.

2.2.12 Saving and Restoring Adjustment Values

2.2.12.1 Saving Adj. Values to Floppy Disk

1. Connect display and keyboard to the internal PC.
2. **If instrument is on** - quit Konelab software by **pressing E**.
   - **If instrument is off** - boot the instrument. Select item **2. Command prompt** from boot up menu by pressing the arrow key down (⇓) once and after that pressing enter.
3. Insert **formatted** floppy disk to the floppy drive. Note! The floppy drive is upside down.
4. When in the screen is displayed **C://x30**, copy adjustment files to the floppy disk with command **save_adj.**
5. Remove the floppy disk from the drive.
6. Reboot the instrument.

2.2.12.2 Restoring Adj. Values from Floppy Disk

1. Connect display and keyboard to the internal PC.
2. **Instrument is on** - quit Konelab software by pressing E.
   - **Instrument is off** - boot the instrument. Select item **2. Command prompt** from boot up menu by pressing the arrow key down (⇓) once and after that pressing enter.
3. Insert the floppy disk **containing the adjustment values** to the floppy drive.
   - Note! Floppy drive is upside down.
4. When in the screen is displayed **C://x30**, load adjustment files from the floppy disk with command **load_adj**
5. Remove the floppy disk from the drive.
6. Reboot the instrument.

2.3 Adjustments of Konelab 20

2.3.1 General

Note!
Keep CapsLock OFF when adjusting

Keys in use	Alternative keys	Function
1 - 9		Module selection
Y/N	ALT+89/ ALT+78	To save / cancel changes
N	ALT+78	Next
I	ALT+73	Initialisation
R	ALT+82	To restore old adjustment
A <-> **S**	ALT+97 – ALT+115	**1. Motor, Left** <-> **Right movement**
Shift + **A** <-> **S**	A+65 – ALT+83	Left - Right with a long movement
W <-> **Z**	ALT+119 – ALT+122	**2. Motor, Up** <-> **Down movement**
Shift + **W** <-> **Z**	ALT+87 – ALT+90	Up-Down with a long movement
C <-> **V**	ALT+99 – ALT+118	**3. Motor, Forward** <-> **Backward**
Shift + **C** <-> **V**	ALT+67 – ALT+86	Forward - Backward with a long movement
b	ALT+98	To read barcode in the reagent disk / sample disk. (In the sample disk, the segment barcode is read.)
B	ALT+66	In the sample disk, segment and tube barcodes are read.
T	ALT+84	Automatic BCR reading position adjustment
m	ALT+77	To test mixing when adjusting dispenser cuvette positions.
Q	ALT+81	Quit

Note!

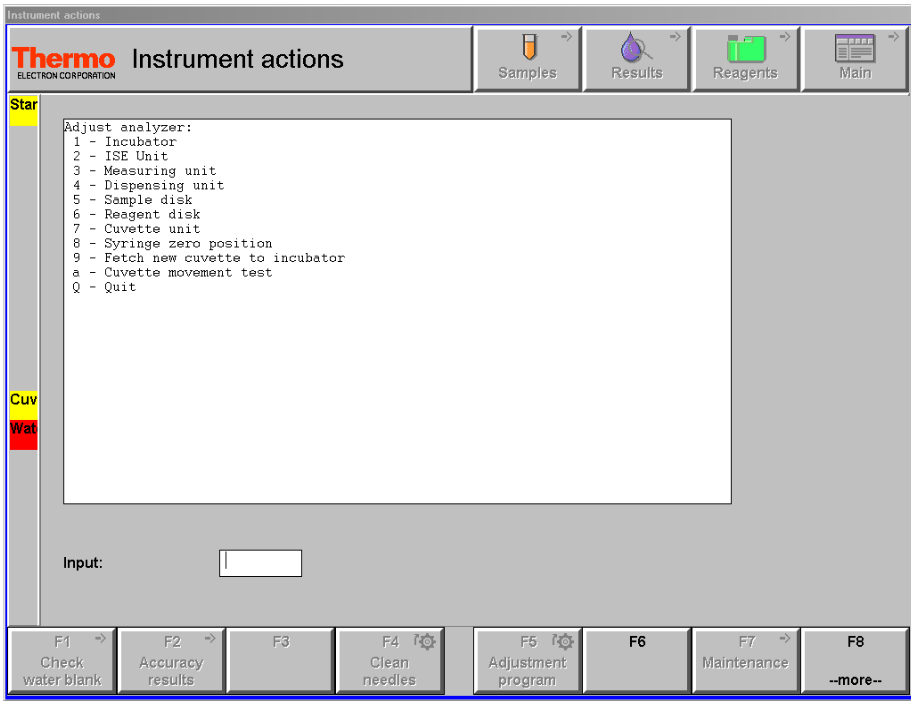
During adjustment program reagent cover can be taken off. Attach the cover back before quitting the adjustment program.

Note!

After each maintenance or adjustment procedure QC run is recommended !

2.3.2 How to Start Adjusting ?

- Open Konelab user interface:
- Click Main -button
- Press F8 -key (More)
- Press F2 -key (Instr. Actions)
- Press F8 (More)
- Press F5 (Adjustment program)



Note!

Konelab 20 and the workstation is a pair. Adjustments of the analyser are valid only with the analyser's own workstation.

If the workstation must be changed, the analyser must be readjusted or analysers adjustments restored from floppy disk.

Recommended order to adjust

- Incubator
- Cuvette unit
- Measuring unit
- Reagent disk
- Sample disk
- Dispensing unit
- ISE unit

Good to know

- The instrument adjusts **'Syringe zero position'** automatically. (refer section 2.2.9)
- **'Fetch new cuvette to incubator position'** is recommended to use when a cuvette has to be moved to the selected incubator position. (E.g. for adjustment of measuring positions in measuring unit (refer section 2.3.3.3))

Note!

After each adjustment section program asks:

"Save adjustments (y / n) ?"

Press key Y (yes) to save adjustments automatically to workstation hard disk.

Dispenser needles

- Before the adjustment of dispensers, check that the arms of them are mechanically adjusted correctly.

2.3.3 Incubator

Adjustment tools needed:

- Cuvettes in every incubator position
- Take plastic cover, incubator metal cover and black measuring channel cover off.

Note!

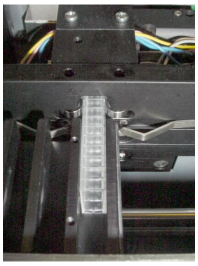
Cuvette arm is powerless during incubator adjustment. However it can be moved manually.

Incubator adjustment positions are:

- Cuvette arm positions

Cuvette arm position 1:

- Fetch manually cuvette with arm from incubator and check that the cuvette is not touching to guiding bearings.
- Adjust incubator if needed .



- Adjust other cuvette arm positions 2-6 in a similar way.
- Save adjustments y/n?

2.3.4 Cuvette Unit

Cuvette unit adjustment positions are:

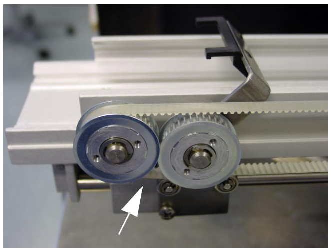
- Pusher open position
- Pusher position for cuvette fetch

Note!

Cuvette feeder must be empty for *"Pusher open position"* adjustment!

Pusher open position:

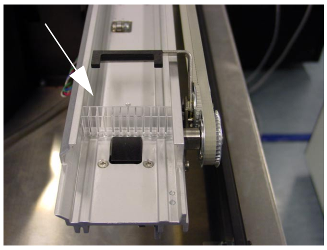
- Adjust pusher belt gear and the loader end belt gear to nearly touch each other.
- Press pusher with fingers to see more clearly adjustment movement.



Note!

After adjustment:

"Put one cuvette in the feeder and press space bar to continue"



Pusher position for cuvette fetch:

- First the program will automatically adjust the distance to cuvette sensing opto.
- **For example:** On the screen is displayed text: "Adjusting pusher position for cuvette fetch, opto detected at -54947". Compare opto value to adjustment value **and adjust 4-6 steps more from detection point**. Adjustment absolute value must be bigger.
- **Fetch a cuvette manually from feeder and check that cuvette aligns straight with cuvette arm.**
- **Readjust pusher if needed.**
- Press pusher down to see more clearly adjustment movement.
- **Save adjustments y/n?**

2.3.5 Measuring Unit

Measuring unit adjustment positions are:

- Cuvette arm
- Filter disk/ beam alignment
- Measuring positions
- Lamp voltages and gains

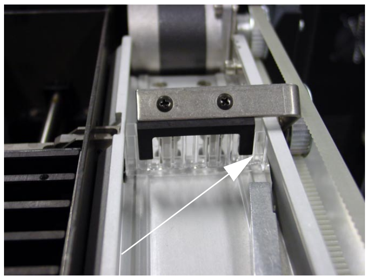
2.3.5.1 Cuvette Arm

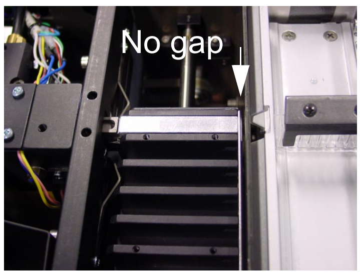
Adjustment tools needed:

- Loader position adjustment: Cuvette without hook in loader and feeler gauge (886650)
- Incubator positions 1 and 6: Metal cuvette in incubator pos.1 and 6
- Cuvette exit position: Normal cuvette

1. Cuvette arm adjustment positions:

- Loader position
- Incubator positions 1 and 6
- Cuvette exit position

Cuvette loader position: • The adjustment is correct when you can hardly move the feeler gauge (0.1mm) from the space between the cuvette rear end and the loader wall.	

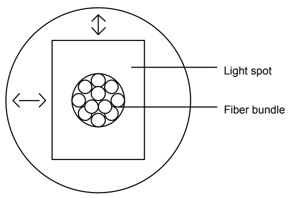
Incubator positions 1 and 6: • The adjustment is correct when the cuvette arm is touching softly the metal cuvette end without any gap.	

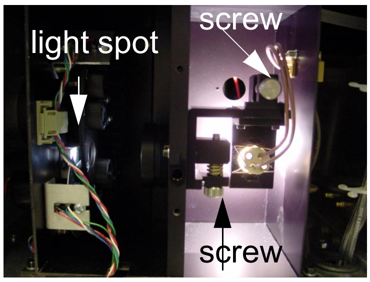
Cuvette exit position:

- **Adjust cuvette arm 4 long steps** (⇑+**S**) toward incubator and save adjustments.
- **Remove metal cuvettes from incubator positions 1 and 6.**
- **Insert normal cuvette into incubator position 6 and start to adjust cuvette arm again from menu** . In exit position, **press the adjustment key (A)** until you find the position where the cuvette will drop to the waste compartment.
- **Adjust 30 steps more (key A) or 3 long steps (shift ⇑+A) from the dropping point.**
- **Save adjustments y/n ?**

2.3.5.2 *Filter Disk / Beam Alignment*

- When filter disk / beam alignment is selected, the instrument will first drive the filter wheel to its empty position (15).
- **Adjust the light spot over the fiber bundle** with the adjustment screws (2 pcs) in the lamp assembly.





Filter wheel filter position 1

- Adjust filter wheel to center lamp beam to filter 1 cover.

Note!

After filter wheel adjustment procedure QC run is recommended!

2.3.5.3 Measuring Positions

Quit to adjustment program main menu to **fetch a new cuvette to incubator position 1**.

Return back to Measuring unit / Measuring positions.

Measuring positions:

- Instrument adjusts positions automatically.
- Program finds cuvette cell walls starting from rear end of cuvette (=position 12) and sets the value to the middle of the cell one by one. (In software 5.0.X or lower).
- Program finds cuvette cell walls starting from front end of cuvette (=position 1) and sets the value to the middle of the cell by one. (In software 6.0.X).
- After adjustment the old and new values are displayed and asked: Save new values YES/NO. If adjustment fails, it stops and gives an error message.

2.3.5.4 Lamp Voltages and Gains

The lamp voltages and gains are adjusted automatically during Start up. Results seen in this function are from the latest Start up.

Note!

Results what are seen in this function are from the latest Start up.

Gain values are: 0, 1, 2, 3, 4, 5.

When the gain is low the filter is good. With 340 and 380 the gain is usually 2 or 3. All the rest filter gains are usually 0, 1 or 2. If the gain is 5, filter or lamp is getting old or beam alignment is bad or blocked.

Note!

The lamp voltage is 0 when the filter position has a cover plate.

2.3.6 Reagent Disk

Adjustment tools needed:

- Empty 20 ml reagent bottle (not obligatory)

Reagent disk adjustment position is:

- Reagent plate segment / vial inserting position

Vial inserting position:

- Open vial / inserting cover and insert a reagent bottle into the reagent plate position 1.
- Adjust reagent plate to middle of the hole in reagent storage cover.

2.3.7 Sample Disk

Sample disk adjustment positions are:

- Segment / vial inserting position, segments 1-6
- Barcode reader position, segments 1-6
- STAT sample cup inserting positions, 1-5, ISE wash/prime
- Barcode reader position, STAT samples 1-5, ISE wash/prime

Segment / vial inserting position segment position 1:

- Insert segment into the sample disk position 1.
- Adjust sample disk to middle of the hole in sample storage front side.

Barcode reader position segment position 1:

- Insert a segment with barcoded sample tubes into the sample disk position 1.
- **Press b to read the segment barcode**. If reading is OK, no beep is heard. By adjusting the disk, find the both ends of the reading area until beep sound is heard. Count the steps from side to side and set the adjustment to the middle.

Note!

Good quality barcode stickers are needed.

Automatic BCR adjustment:

- After the segment barcode reading position is adjusted, the analyser will adjust the barcode reading positions automatically for all sample tubes. **Press t to start adjustment.**
- Accept new adjustments y/n
- You can check the segment and tube barcode readings. **Press B (Shift + b)**.
- When the first segment has been adjusted the program asks if the user wants that all other 5 segment positions are calculated: *Calculate other segment positions before adjusting them? y/n* **Choose Yes**.

All other positions (2-6) are adjusted in a similar way.

- **Save adjustments y/n?**

STAT cup 1 inserting position:

- Insert a sample tube into the STAT sample position 1.
- Adjust disk if needed.

STAT cup 1 barcode reader position:

- Insert barcoded sample tube into the STAT sample position 1. Press **b** to read the sample tube barcode. If reading is OK, no beep is heard. By adjusting the disk, find the both ends of the reading area until beep sound is heard.
- Count the steps from side to side and set the adjustment to the middle.
- When the STAT sample position 1 has been adjusted, the program asks if the user wants all other 5 STAT sample positions are calculated before adjustment:

Calculate other STAT positions before adjusting them? y/n.
choose *Yes*

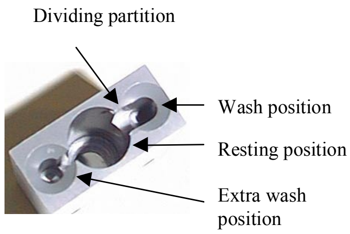
STAT sample inserting / barcode positions 2-6 are adjusted similar way. Position 6 is ISE wash /prime.

Save adjustments y/n?

2.3.8 Dispensing Unit of Konelab 20, 20i

2.3.8.1 Dispenser

Dispenser adjustment positions are:



1. General positions
- Phi drive level position
- Needle check position
- Manual needle wash position
- Sample wash position
- Sample extra wash position
- Resting position

2. Cuvette positions
3. Reagent positions
4. STAT positions
6. Segment positions
- Outer ring, position 10 for all 6 segments
- Inner ring, position 3 for all 6 segments
- Sample tube in position 11 for the segment position 1

8. Test wash

1. General positions

Phi drive level position:

- Adjust dispenser needle tip 3 - 4 mm above the reagent cover, where the dispenser moves.

Needle check position:

- The needle check position is over the right edge of the washing station.
- Adjust the needle tip to the washing station top surface level.

Manual needle wash position:

Phi-movement:
• Adjust needle over the resting position.

Dispenser wash position:
• Move the needle over the dividing partition.

Y-movement:
• Press Z (⇓) and find the position when the needle is touching the dividing partition.
• **Adjust 3 steps up W (⇑) from the partition**

Phi-movement:
• Adjust back to the middle of the wash position.

Dispenser extra wash position:

Phi movement:
• Adjust to the middle of the extra wash position. Wash position Y-movement adj. value is used in Extra wash position.

Resting position:

• Dispenser arm is adjusted about **1 mm** above the stick. Adjust the Phi-movement to the middle of the resting position.

Save adjustments y/n.

Check the wash positions with the point 8 - Test wash.

2. Cuvette positions in incubator positions 1 and 6

- Cuvette cell 1 upper position
- Cuvette cell 1 position
- Cuvette cell 12 position

Adjustment tools needed:

- cuvettes in incubator positions 1 and 6. (Use function **9: Fetch new cuvette to incubator** instead of putting cuvettes manually into positions.)

> **Note!**
> **Incubator is adjusted only in positions:**
> ***cuvette cell 1 upper,***
> ***cuvette cell 1***

Cuvette cell 1 upper position
(Incubator position 1)

Phi-movement:

- Adjust dispenser needle to the middle of the cuvette cell 1.

Incubator:

- Adjust incubator that needle is in the middle of the cuvette cell 1.

Y-movement:

- Adjust the needle tip **1 mm under** the cuvette top surface.

Cuvette cell 1 position
(Incubator position 1)

Phi-movement:

- Adjust dispenser needle to the middle of the cuvette cell 1.

Incubator:

- Adjust incubator that needle is in the middle of the cuvette cell 1.

Y-movement:

- Press **Z** (⇓) and find the position when the needle is touching the bottom of the cuvette.
- **Adjust 3 steps up W (⇑) from the bottom.**

Cuvette cell 12 position
(Incubator position 1)

Phi-movement:

- Adjust dispenser needle to the middle of the cuvette cell 12.

Y-movement:

- Press **Z** (⇓) and find the position when the needle is touching the bottom of the cuvette.
- **Adjust 3 steps up W (⇑) from the bottom.**
- **Press m button to check the mixing**

When the cuvette cell positions 1 and 12 have been adjusted, the program asks if the user wants all other positions to be calculated before adjustment:

Calculate middle cuvette positions before adjusting them? y/n

Choose *Yes*.

Positions 2 to 11 can be adjusted separately.

Cuvette cell positions in incubator position 6 are adjusted in a similar way.

Save adjustments y/n.

3. Reagent positions

Note!

- **Insert 20 ml reagent bottles into the reagent disk positions 1, 11, 21 and 31.**
- **Each reagent bottle position have an own bottom adjustment value.**

Reagent disk position cups 1, 11, 21 and 31:

Phi-movement:

- Adjust dispenser needle to middle of the bottle neck.

Reagent disk:

- Adjust disk so that the needle is in middle of the bottle neck.

Y-movement:

- Press **Z** (⇓) to find the position when the needle is touching the bottom of the bottle.
- **Adjust 4 steps up W (⇑) from the bottom.**

Note!

Sample disk has three (3) types of circles for samples:

- **STAT (1-6)**
- **Segment outer (7-14)**
- **Segment inner (1-6)**

Dispenser has only one (1) Y- and Phi- adjustment value for all positions in one circle.

4. STAT positions

Note!

Insert 0.5 ml cups into the STAT positions.

Phi-movement:

- Adjust dispenser needle to the middle of sample cup.

Sample disk:

- Adjust disk so the needle is in the middle of the sample cup.

Y-movement:

- Press **Z** (⇓) to find the position when the needle is touching the sample cup bottom.
- **Adjust 2 steps up W (⇑) from the bottom.**

When the first STAT position has been adjusted the program asks if the user wants all other 5 STAT positions to be calculated:

Calculate other STAT positions before adjusting them? y/n

Choose *Yes.*

Check all STAT positions one by one the needle goes to the middle of the cup without touching the cup bottom.

Save adjustments y/n?

6. Segment positions

Note!

- **Insert 0.5ml cups into the segment positions 3 and 10 and a sample tube into the position 11.**
- **Insert segment to the sample disk position 1.**
- **Insert second segment with cups in positions 3 and 10 to sample disk position 2.**

Cup position 10 adjustment:

Phi-movement:
- Adjust the dispenser needle to the middle of sample cup.

Sample disk:
- Adjust disk so that the needle is in the middle of the sample cup.

Y-movement:
- Press **Z** (⇓) to find the position when the needle is touching the sample cup bottom.
- **Adjust 3 steps up W (⇑) from the bottom.**

Adjust Cup position 3 in a similar way.

Tube bottom level in the position 11:

- Press **Z** (⇓) to find the position when the needle is touching the tube bottom.
- **Adjust as many steps up W (⇑) from the bottom as is reasonable.**

(This adjustment is carried out with customers' typical tubes !)

When the first segment has been adjusted the program asks if the user wants all other 5 segment positions to be calculated:

Calculate other segment positions before adjusting them? y/n

Choose *Yes.*

Check all segments positions 3 and 10 one by one the needle goes into the middle of the cup without touching the cup bottom. **Tube bottom level is adjusted only once in disk position 1.**

Save adjustments y/n?

2.3.9 Dispensing Unit of Konelab 20XT, 20XTi

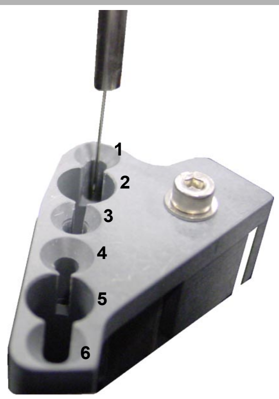
2.3.9.1 Dispenser

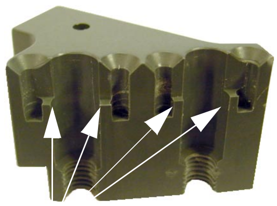
Dispenser adjustment positions are:

1. General positions
- Phi drive level position
- Needle check position
- Manual needle wash position
- Dispenser wash position (no.1)
- Dispenser extra wash position (no.3)
- Resting position (no. 2)
- Reagent wash position (no. 6)
- Reagent extra wash position (no. 4)

2. Cuvette positions
3. Reagent positions
4. STAT positions
6. Segment positions
- Outer ring, position 10 for all 6 segments
- Inner ring, position 3 for all 6 segments
- Sample tube in position 11 for the segment position 1

8. Test wash





Dividing partitions

1. General positions

Phi drive level position:

- Adjust dispenser needle tip 2 - 3 mm above the cuvette loader / incubator cover, where the dispenser moves.

Needle check position:

- The needle check position is over the right edge of the sample side washing station. Adjust the needle tip to the washing station top surface level.

Dispenser manual needle wash position:

Phi-movement:

- Adjust needle to the middle of the resting position on sample side.

Dispenser wash position:

- Move the needle over the dividing partition.

Y-movement:

- Press Z (⇓) and find the position when the needle is touching the dividing partition.
- **Adjust 3 steps up W (⇑) from the partition.**

Phi-movement:

- Adjust back to the middle of the dispenser wash position

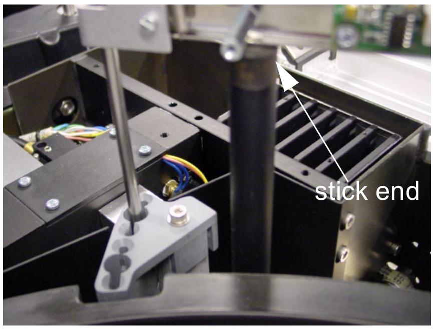
Dispenser extra wash position:

Phi movement:

- Adjust to the middle of the dispenser extra wash position. Dispenser wash position Y-movement adjustment value is used in dispenser extra wash position.

Resting position:

- Adjust dispenser arm about 1 mm above the stick end.
- Adjust the Phi-movement to the middle of the resting position on sample side.



Reagent wash positions:

- Move the needle over the dividing partition.

Y-movement:

- Press Z (⇓) and find the position when the needle is touching the dividing partition. **Adjust 3 steps up W (⇑) from the partition.**

Phi-movement:

- Adjust back to the middle of the wash position.

Reagent extra wash position:

Phi movement:

- Adjust to the middle of the reagent extra wash position.
- Reagent wash position Y-movement adjustment value is used in reagent extra wash position.
- **Save adjustments y/n?**
- **Test washing positions by choosing the point 8 - Test wash.**

2. Cuvette positions

- Cuvette cell 1 upper position
- Cuvette cell 1 position
- Cuvette cell 12 position

Adjustment tools needed:

- cuvettes in incubator positions 1 and 6. (Use function **9: Fetch new cuvette to incubator** instead of putting cuvettes manually into positions.)

Note!

Incubator is adjusted only in positions:

cuvette cell 1 upper,

cuvette cell 1

Cuvette cell 1 upper position
(Incubator position 1)

Phi-movement:

- Adjust dispenser needle to the middle of the cuvette cell 1.

Incubator:

- Adjust incubator so that needle is in the middle of the cuvette cell 1.

Y-movement:

- Adjust the needle tip **1 mm under** the cuvette top surface.

Cuvette cell 1 position
(Incubator position 1)

Phi-movement:

- Adjust dispenser needle to the middle of the cuvette cell 1.

Incubator:

- Adjust incubator so that needle is in the middle of the cuvette cell 1.

Y-movement:

- Press Z (⇓) to find the position when the needle is touching the bottom of the cuvette.
- **Adjust 3 steps up W (⇑) from the bottom.**

☛

Cuvette cell 12 position
(Incubator position 1)

Phi-movement:

- Adjust dispenser needle to the middle of the cuvette cell 12.

Y-movement:

- Press Z (⇓) to find the position when the needle is touching the bottom of the cuvette.
- **Adjust 3 steps up W (⇑) from the bottom.**

When the cuvette cell positions 1 and 12 have been adjusted, the program asks if the user wants all other positions to be calculated before adjustment:

Calculate middle cuvette positions before adjusting them? y/n

Choose *Yes*.

Positions 2 to 11 can be adjusted separately.

Cuvette cell positions in incubator position 6 are adjusted in a similar way.

Save adjustments y/n.

3. Reagent positions

Note!

- **Insert 20 ml reagent bottles into the reagent disk positions 1, 11, 21 and 31.**
- **Each reagent bottle position have an own bottom adjustment value.**

Reagent disk position cups 1, 11, 21 and 31:

Phi-movement:

- Adjust dispenser needle to middle of the bottle neck.

Reagent disk:

- Adjust disk so that the needle is in middle of the bottle neck.

Y-movement:

- Press **Z** (⇓) to find the position when the needle is touching the bottom of the bottle.
- **Adjust 4 steps up W (⇑) from the bottom.**

Note!

Sample disk has three (3) types of circles for samples:

- **STAT (1-6)**
- **Segment outer (7-14)**
- **Segment inner (1-6)**

Dispenser has only one (1) Y- and Phi- adjustment value for all positions in one circle.

4. STAT positions

Note!

Insert 0.5 ml cups into the STAT positions.

Phi-movement:

• Adjust dispenser needle to the middle of sample cup.

Sample disk:

• Adjust disk so the needle is in the middle of the sample cup.

Y-movement:

• Press **Z** (⇓) to find the position when the needle is touching the sample cup bottom.

• **Adjust 2 steps up W (⇑) from the bottom.**

When the first STAT position has been adjusted the program asks if the user wants all other 5 STAT positions to be calculated:

Calculate other STAT positions before adjusting them? y/n

Choose *Yes.*

Check all STAT positions one by one the needle goes to the middle of the cup without touching the cup bottom.

Save adjustments y/n?

6. Segment positions

Note!

- **Insert 0.5ml cups into the segment positions 3 and 10 and a sample tube into the position 11.**
- **Insert segment to the sample disk position 1.**
- **Insert second segment with cups in positions 3 and 10 to sample disk position 2.**

Cup position 10 adjustment:

Phi-movement:

- Adjust the dispenser needle to the middle of sample cup.

Sample disk:

- Adjust disk so that the needle is in the middle of the sample cup.

Y-movement:

- Press **Z** (⇓) to find the position when the needle is touching the sample cup bottom.
- **Adjust 3 steps up W (⇑) from the bottom.**

Adjust Cup position 3 in a similar way.

Tube bottom level in the position 11:

- Press **Z** (⇓) to find the position when the needle is touching the tube bottom.
- **Adjust as many steps up W (⇑) from the bottom as is reasonable.**

(This adjustment is carried out with customers' typical tubes !)

When the first segment has been adjusted the program asks if the user wants all other 5 segment positions to be calculated:

Calculate other segment positions before adjusting them? y/n

Choose *Yes.*

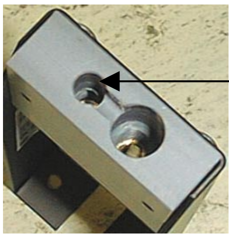
Check all segments positions 3 and 10 one by one the needle goes into the middle of the cup without touching the cup bottom. **Tube bottom level is adjusted only once in disk position 1.**

Save adjustments y/n?

2.3.9.2 Mixer

Sample mixer adjustment positions are:

- General positions
- Cuvette positions
- Test mixing in cuvette



Wash position

1. General positions

Phi drive level:

- Adjust mixer paddle tip 4 - 5 mm above the measuring channel black plastic cover, where the mixer moves.

Check position:

- Adjust the mixer paddle tip in the left edge of the washing station and to the top surface level of the washing station.

Manual needle wash position:

Phi-movement:

- Adjust mixer paddle over the measuring channel.

Y-movement:

- Adjust mixer paddle tip 20 long steps above the surface of washing station

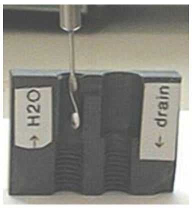
Wash position:

Phi-movement:

• Adjust mixer paddle to the middle of the washing position.

Y-movement:

• Adjust straight part of the paddle above the washing station as shown in figure below:



Resting position:

Phi-movement:

• Adjust paddle to the middle of the wash position.

Y-movement:

• Adjust the mixer arm 1 mm above the stick.

Save adjustments y/n?

2. Cuvette positions

Adjustment tools needed:

• Cuvettes in incubator positions 1 and 6.

☛

Cuvette cell 1position:

Phi-movement:

• Adjust the mixer paddle to the middle of the cuvette cell.

Incubator:

• Adjust incubator so that paddle is in the middle of the cuvette cell.

Y-movement:

• Press **Z** (⇓) to find the position where the paddle is touching the bottom of the cuvette.

• Adjust 3 steps up W (⇑) from the bottom.

• Press m button to check the mixing.

☛

Cuvette cell 12 position:

Phi-movement:

• adjust the mixer paddle to the middle of the cuvette cell.

Y-movement:

• Press **Z** (⇓) and find the position when the paddle is touching the bottom of the cuvette.

• Adjust 3 steps up W (⇑) from the bottom.

• Press m button to check the mixing.

After adjustment program asks if the user wants other positions to be calculated:

Calculate middle cuvette positions before adjusting them y/n?

Choose *Yes*.

Positions 2 to 11can be adjusted separately.

Cuvette positions in incubator position 6 is adjusted in a similar way.

Save adjustments y/n?

9. Test mixing in cuvette:

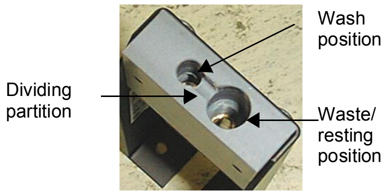
• Test mixing in all 12 cell positions in incubator positions 1 and 6.

• If mixing is noisy, readjust Phi-position.

2.3.10 ISE Unit

ISE dispenser adjustment positions are:

1. General positions
- Phi drive level position
- Needle check position
- Wash position
- Resting position



4. STAT positions

6. Segment positions,
- outer ring, position 10 for all 6 segments
- inner ring, position 3 for all 6 segments
- sample tube position 11 for the segment 1

Note!

Sample disk has three (3) circles for samples:
- STAT (1-6)
- Segment outer (7-14)
- Segment inner (1-6)

Dispenser has only one Y- and Phi- adjustment value for all positions in one circle.

1. General positions

Phi drive level position:

- Adjust dispenser needle tip **2 - 3 mm** above the reagent cover where the ISE dispenser moves.

Needle ISE dispenser check position:

- ISE needle check position is in the left edge of the washing station.
- Adjust needle tip to washing station top surface level.

ISE dispenser wash position:
• Move needle over the dividing partition.

Y-movement:
• Press **Z** (⇓) to find the position when the needle is touching the dividing partition.
• **Adjust 3 steps up W (⇑) from the partition.**

Phi-movement:
• Adjust back to the middle of the wash position.

ISE dispenser waste position:

• Adjust the needle to the middle of the washing position.

Resting position:

• Adjust dispenser arm about **1 mm above** the stick.
• Adjust the dispenser needle to the middle of the resting position.

4. STAT positions

Note!

Insert 0.5 ml cups into the STAT positions.

Phi-movement:

- Adjust dispenser needle to the middle of sample cup.

Sample disk:

- Adjust disk so that the needle is in the middle of the sample cup.

Y-movement:

- Press **Z** (⇓) to find the position when the needle is touching the sample cup bottom.
- **Adjust 2 steps up W (⇑) from the bottom.**

Check in all STAT sample positions one by one the needle goes to the middle of the cup without touching the cup bottom.

Save adjustments y/n?

6. Segment positions

Note!

- **Insert 0.5 ml cups into the segment positions 3 and 10 and a sample tube into the position 11.**
- **Insert segment to the sample disk position 1.**
- **Insert second segment with cups in positions 3 and 10 to sample disk position 2.**

Note!

- **Sample disk has three (3) circles for samples:**
- STAT (1-6)
- Segment outer (7-14)
- Segment inner (1-6)

Dispenser has only one Y- and Phi -adjustment value for all positions in one circle.

Cup position 10 adjustment:

-Phi-movement:

- Adjust the dispenser needle to the middle of sample cup.

Sample disk:

- Adjust disk so that the needle is in the middle of the sample cup.

Y-movement:

- Press **Z** (⇓) to find the position where the needle is touching the sample cup bottom.
- **Adjust 3 steps up W (⇑) from the bottom.**

Cup position 3 is adjusted in a similar way.

Tube bottom level in the position 11:

- Press **Z** (⇓) to find the position where the needle is touching the tube bottom.
- **Adjust as many steps up W (⇑) from the bottom as reasonable.**

This adjustment is carried out with customers' typical tubes !

When positions in the first segment has been adjusted, the program asks if the user wants all other segments to be calculated:

Calculate all other positions before adjusting them? y/n

Choose *Yes*.

Check in all segments' positions 3 and 10 one by one needle goes into the middle of the cup without touching the cup bottom. **Tube bottom level is adjusted only once in segment 1.**

Save adjustments y/n ?

2.3.11 Saving and Restoring Adjustment Values

2.3.11.1 Saving Adj. Values to Floppy Disk

1. Exit Konelab software.
2. Insert **formatted** floppy disk to the workstation floppy drive.
3. Save adjustment files: **Start** ⇒ **Programs**

⇒ **Konelab Instrument management** ⇒ **save adjustments**

4. Remove the floppy disk from the drive.

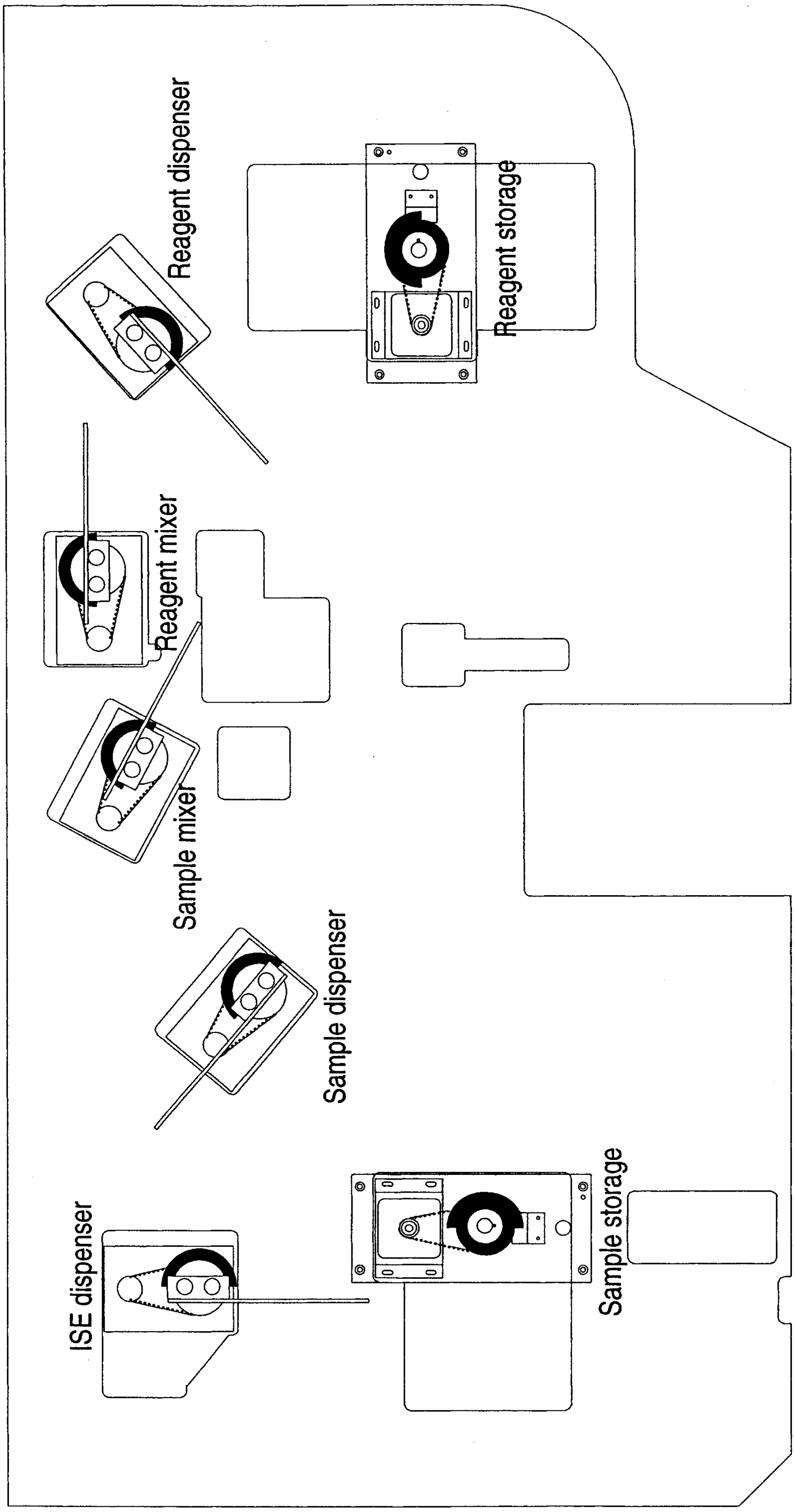
2.3.11.2 Restoring Adj. Values from Floppy Disk

1. Exit Konelab software.
2. Insert floppy disk **containing adjustment values** to workstation floppy drive.
3. Restore adjustment files: **Start** ⇒ **Programs**

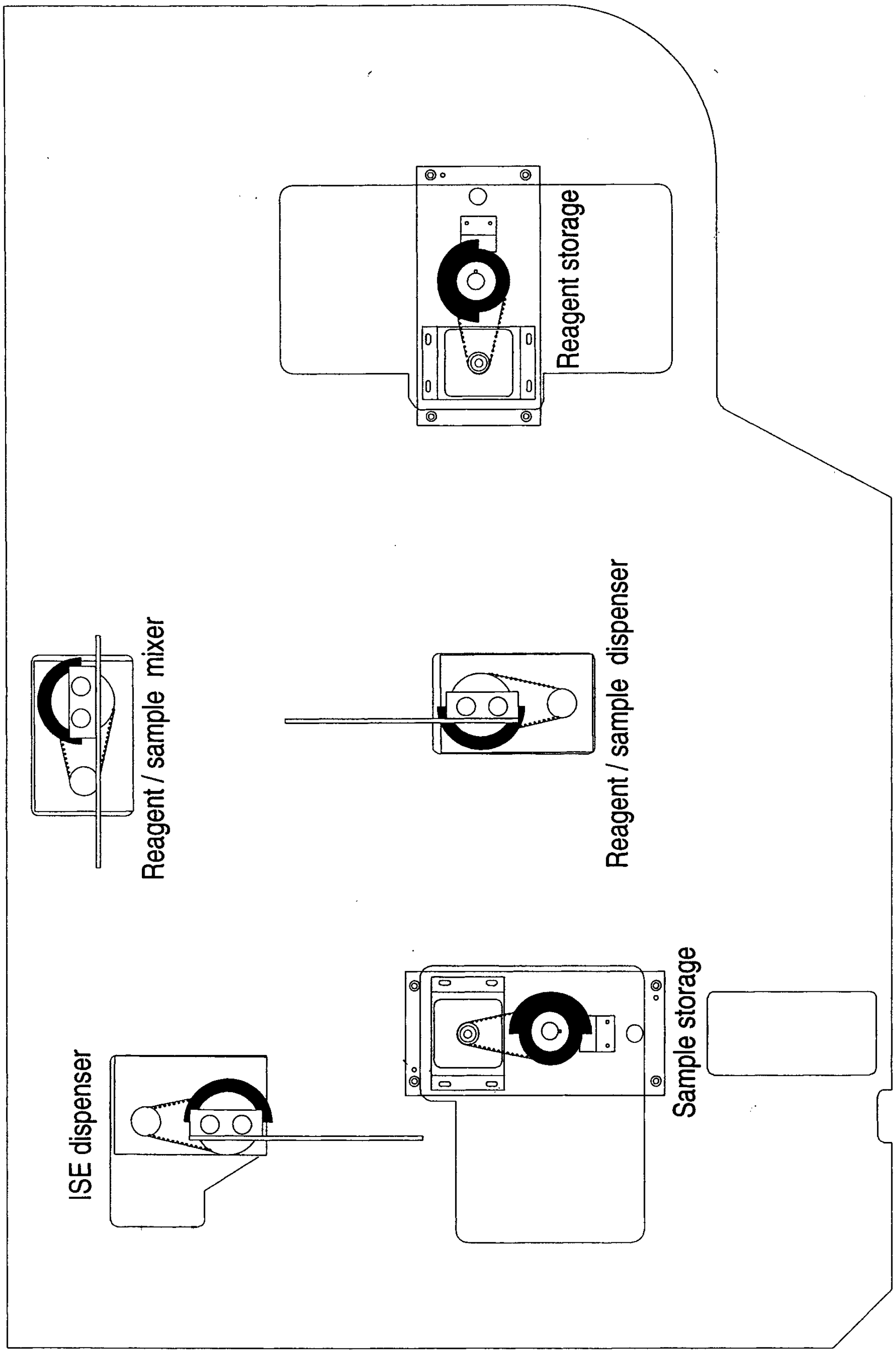
⇒ **Konelab instrument management** ⇒ **restore adjustments**

4. Remove the floppy disk from the drive

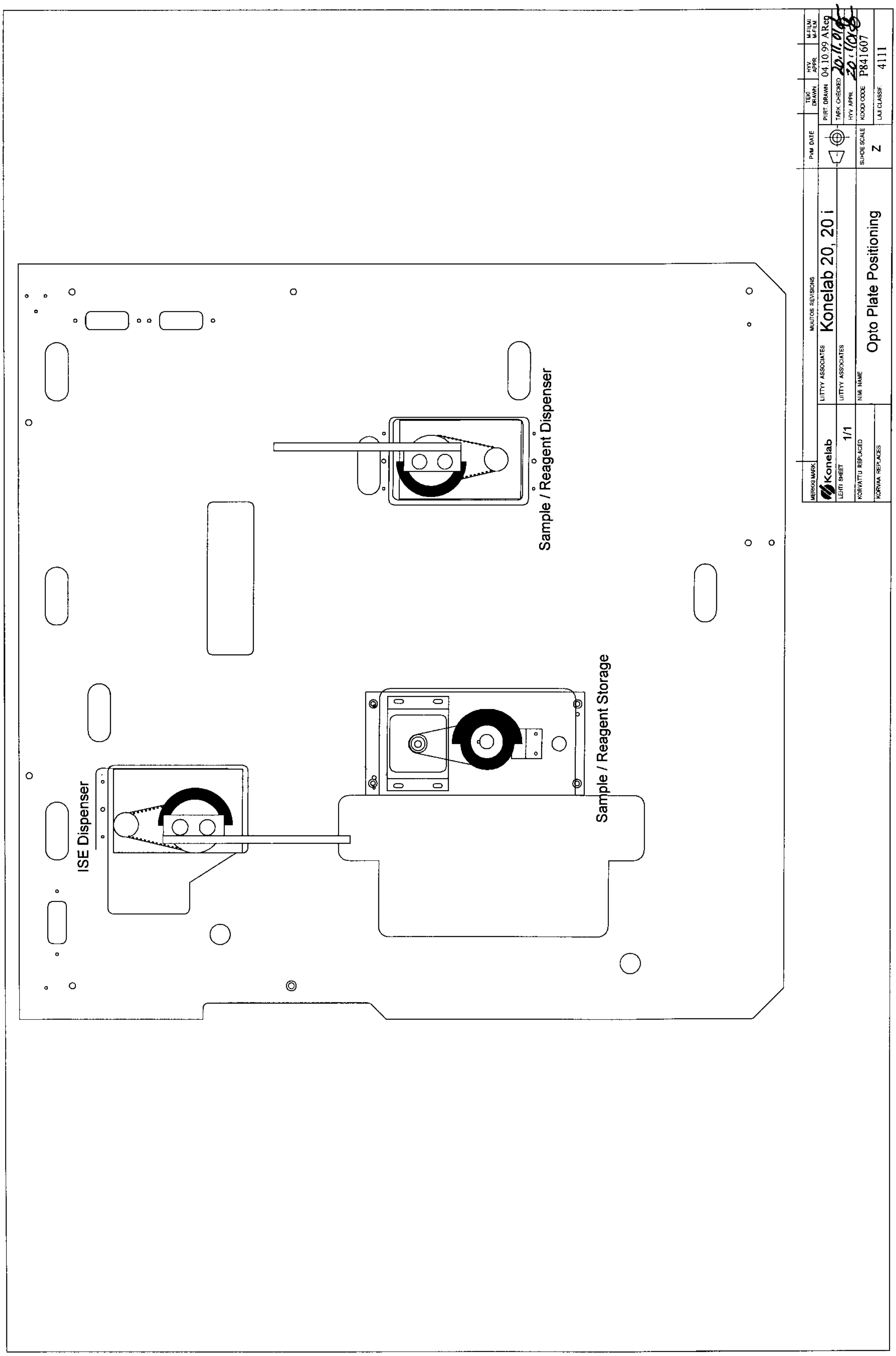
2.4 Konelab Dispenser Arms

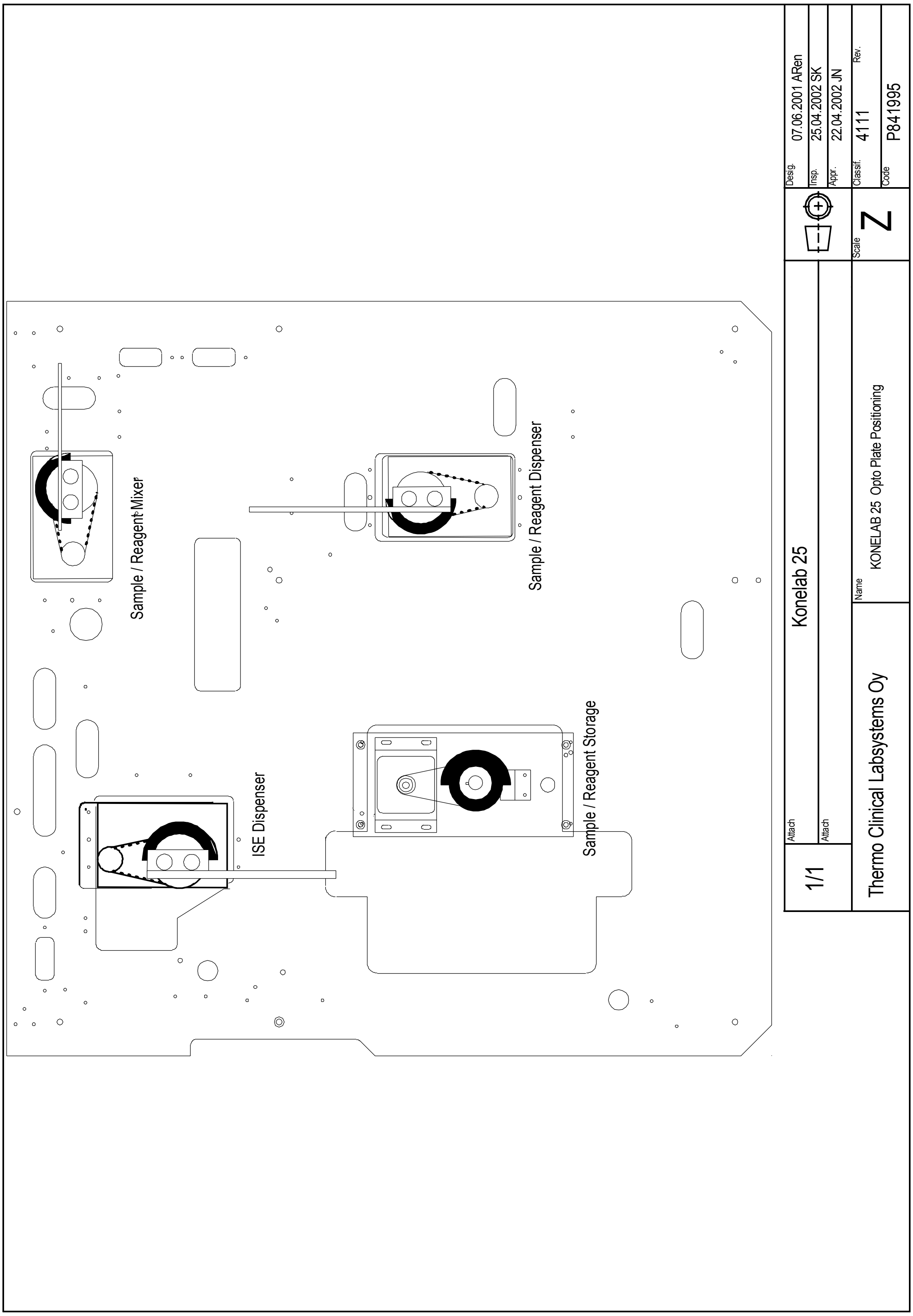


DIRECTIONS OF Konelab 60's DISPENSER ARMS



DIRECTIONS OF Konelab 30's DISPENSER ARMS


Konelab 20, 20 i
Opto Plate Positioning
Sample / Reagent Dispenser
Sample / Reagent Storage
ISE Dispenser
Konelab
1/1
Z
04.10.99 ARep
P841607
4111


Sample / Reagent Mixer
Sample / Reagent Dispenser
ISE Dispenser
Sample / Reagent Storage
Desig. 07.06.2001 ARen
Insp. 25.04.2002 SK
Appr. 22.04.2002 JN
Classif. 4111
Rev.
Code P841995
Scale
Konelab 25
Name KONELAB 25 Opto Plate Positioning
Attach
Attach
1/1
Thermo Clinical Labsystems Oy

Section 3 Cable Charts

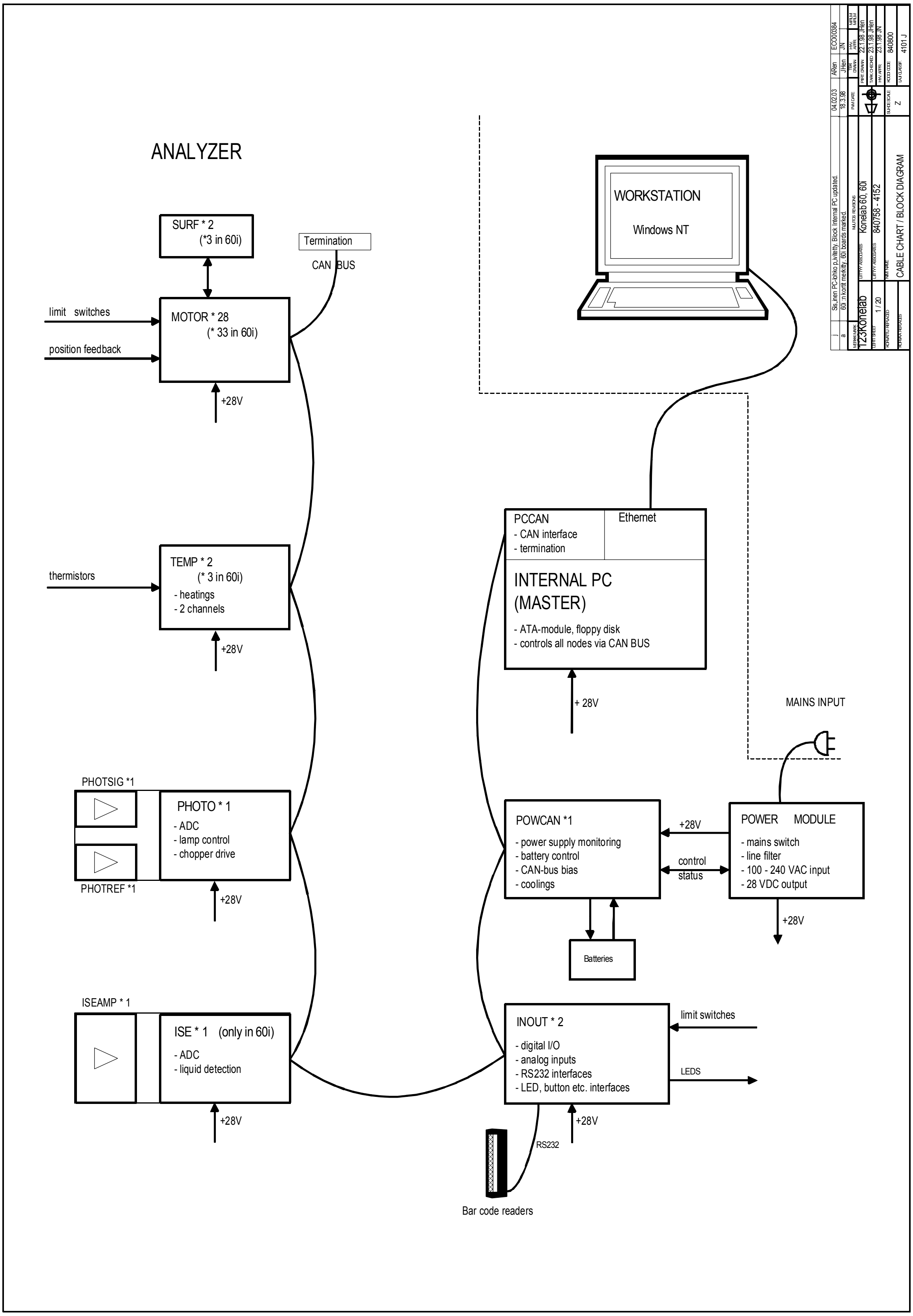


Figure 3-1 Konelab 60, 60i Cable chart / Block diagram (60,60i)

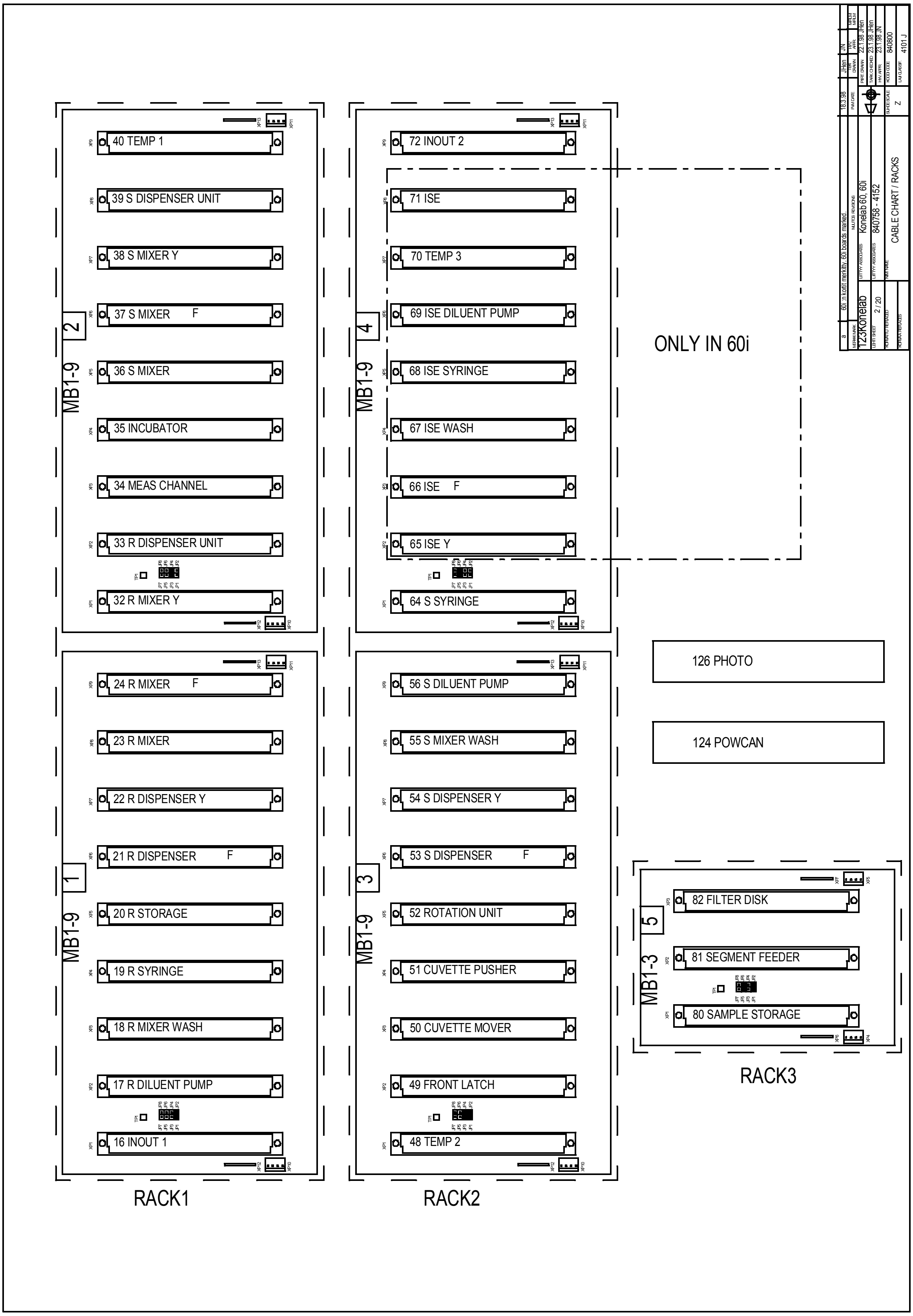


Figure 3-2 Racks (60,60i)

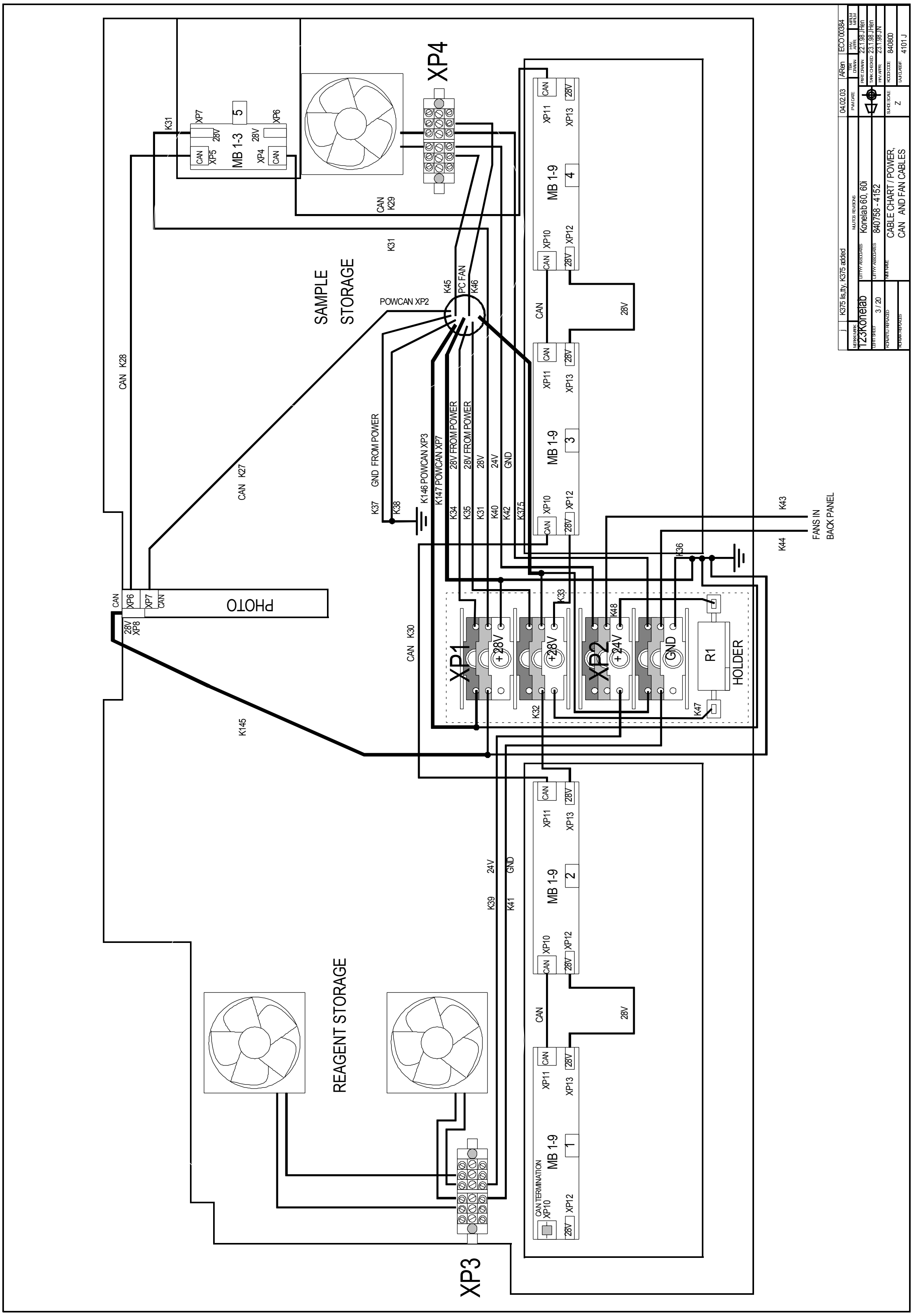


Figure 3-3 Power, can and fan cables (60,60i)

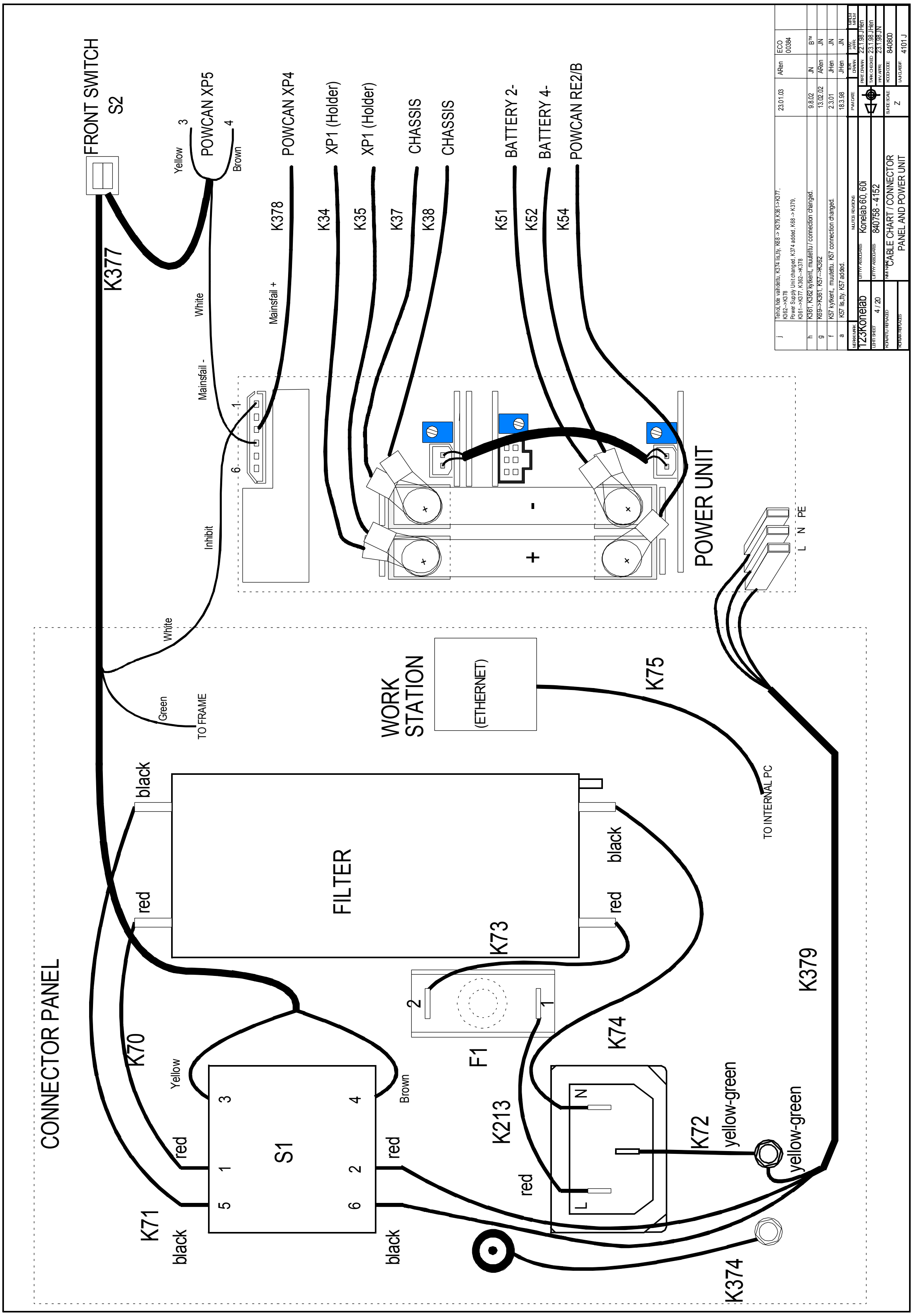


Figure 3-4 Connector panel and power unit (60,60i)

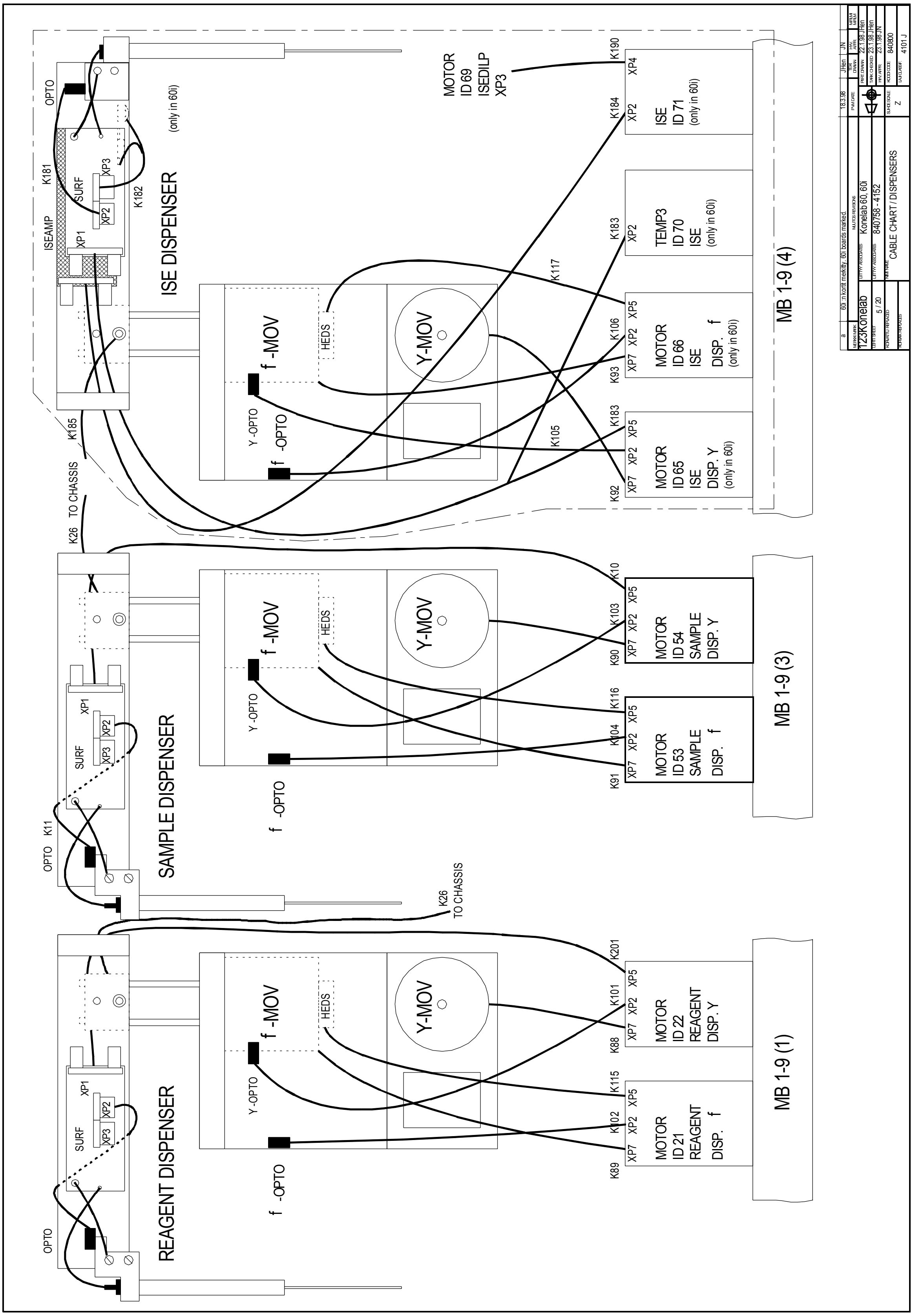


Figure 3-5 Dispensers (60,60i)

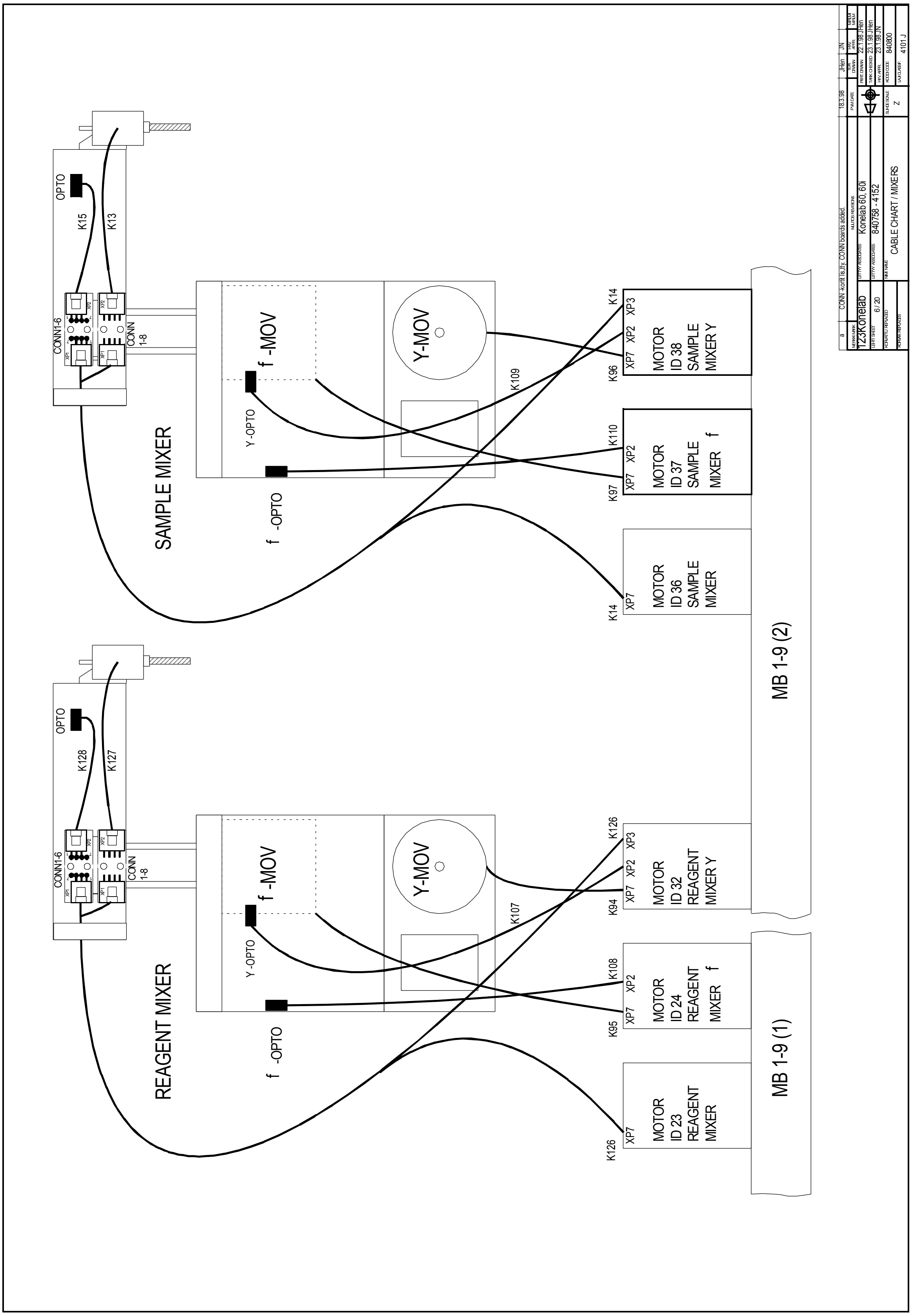


Figure 3-6 Mixers (60,60i)

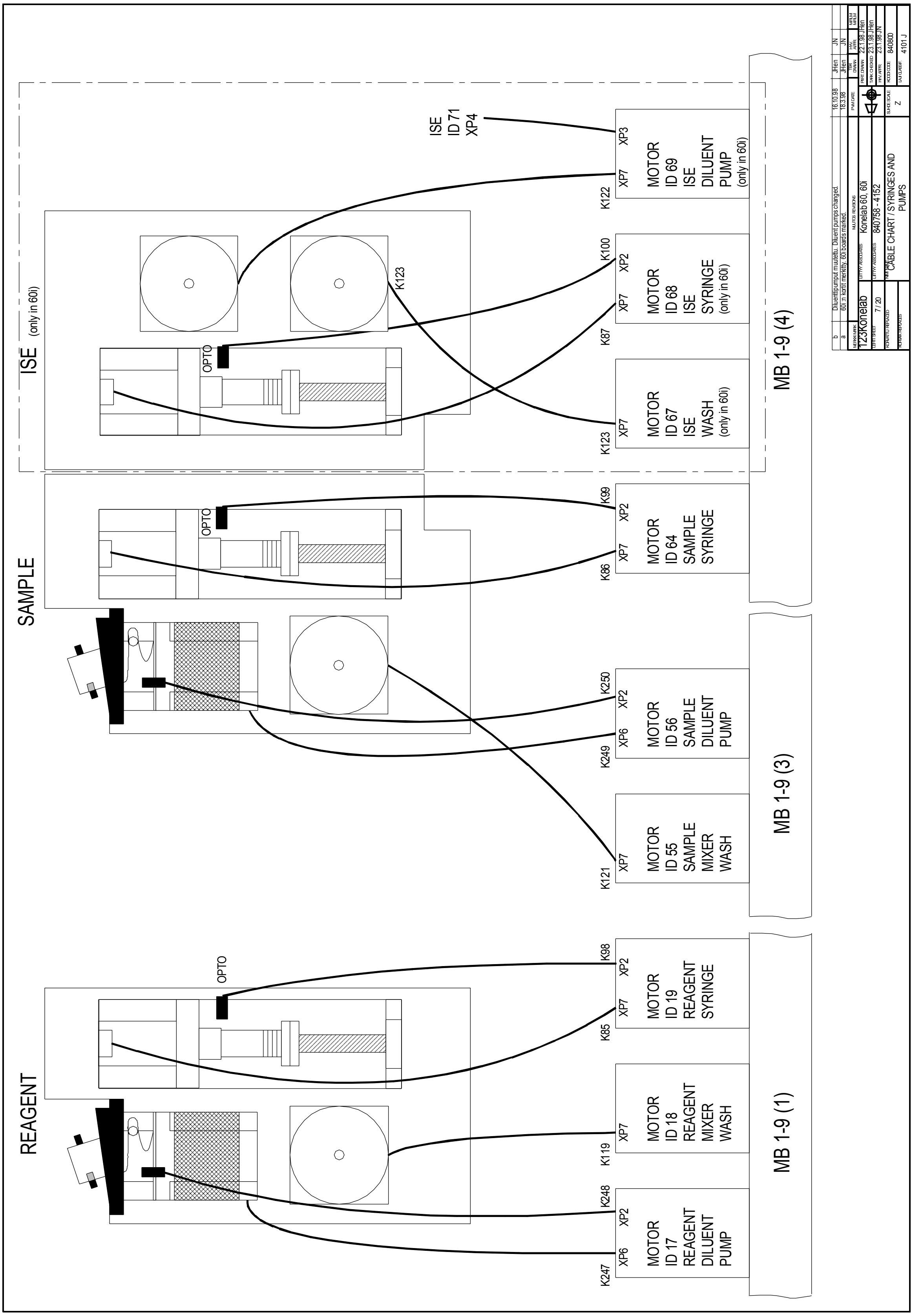


Figure 3-7 Syringes and pumps (60,60i)

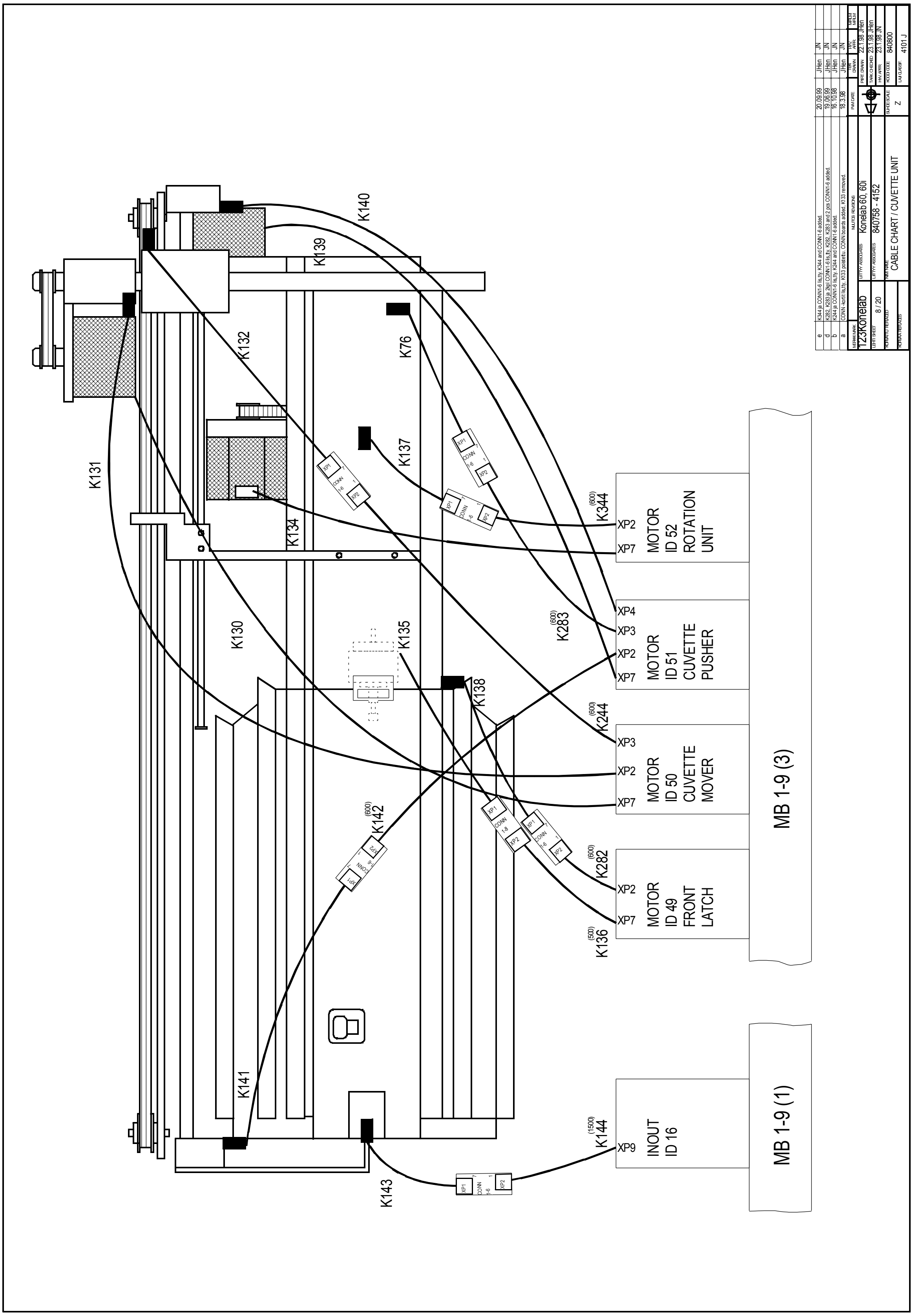


Figure 3-8 Cuvette unit (60,60i)

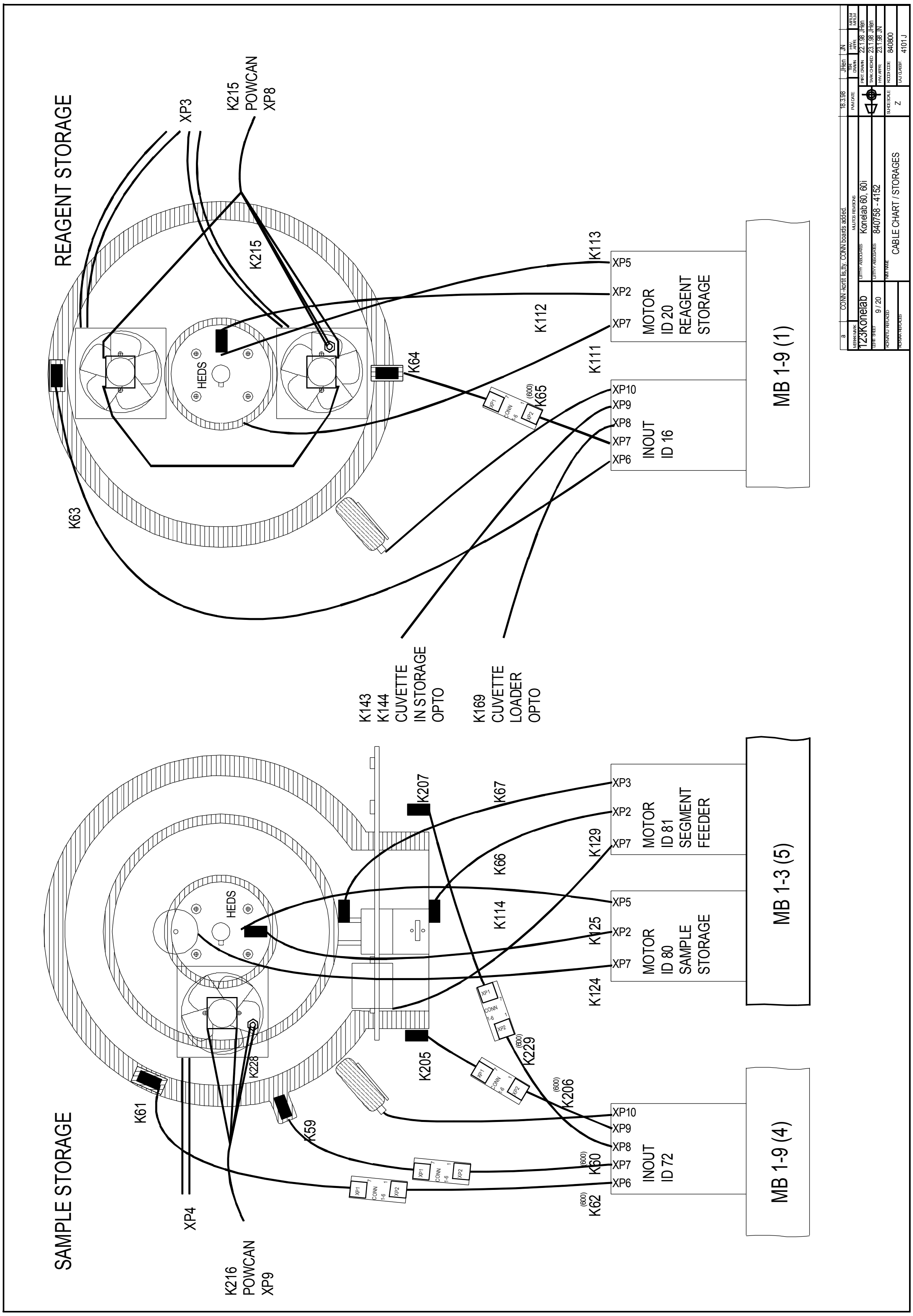


Figure 3-9 Storages (60,60i)

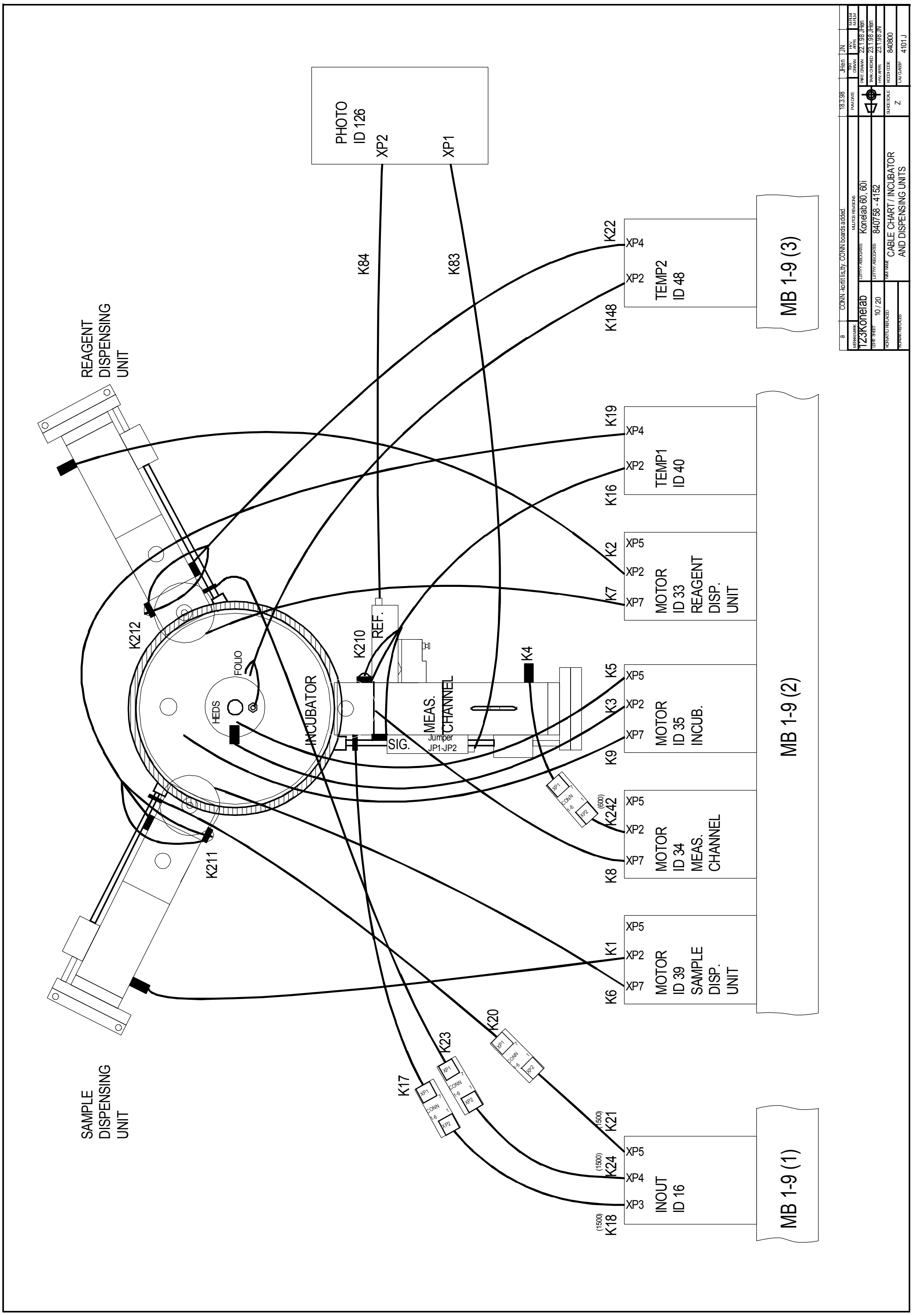


Figure 3-10 Incubator and dispensing units (60,60i)

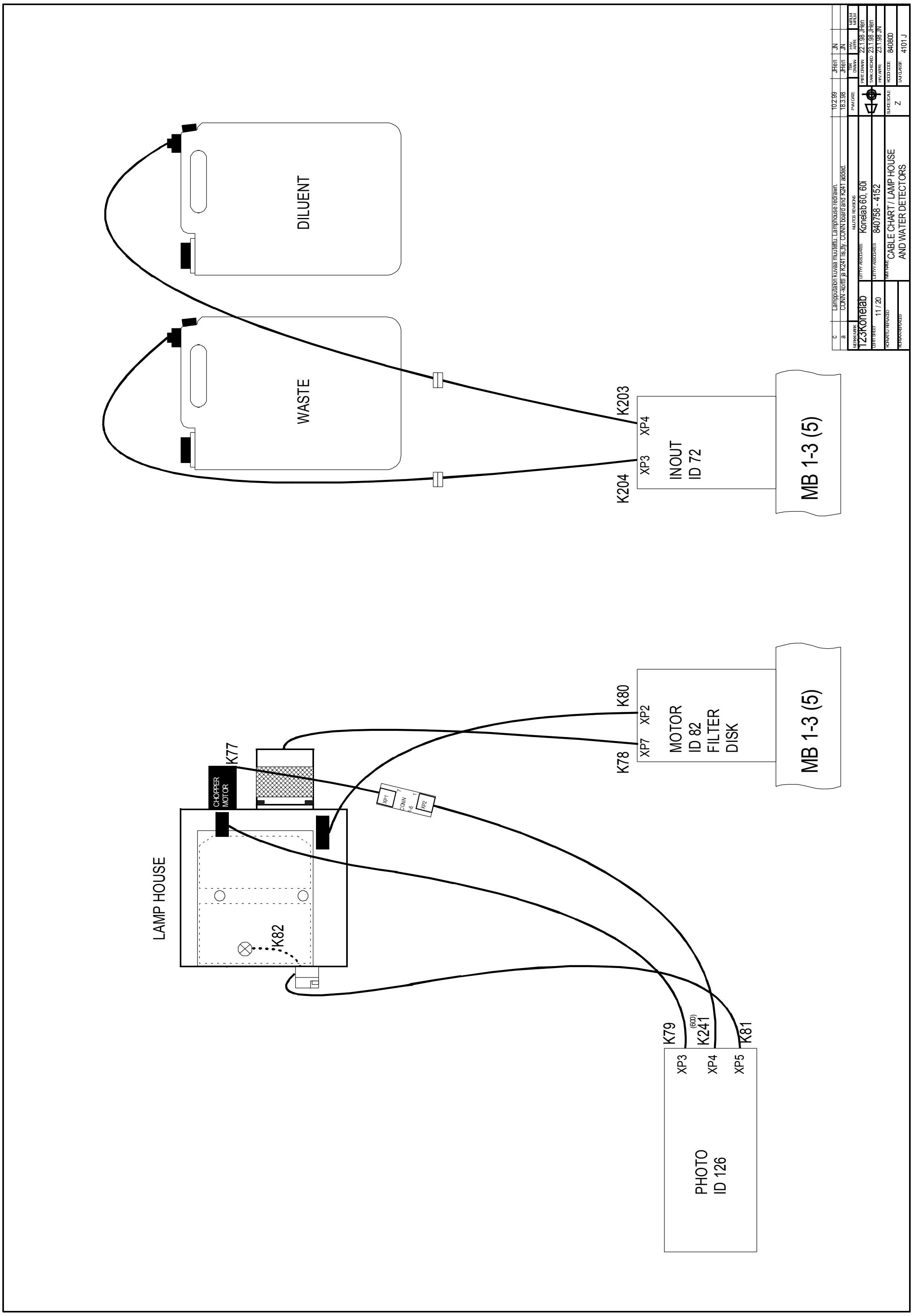


Figure 3-11 Lamp house and water detectors (60,60i)

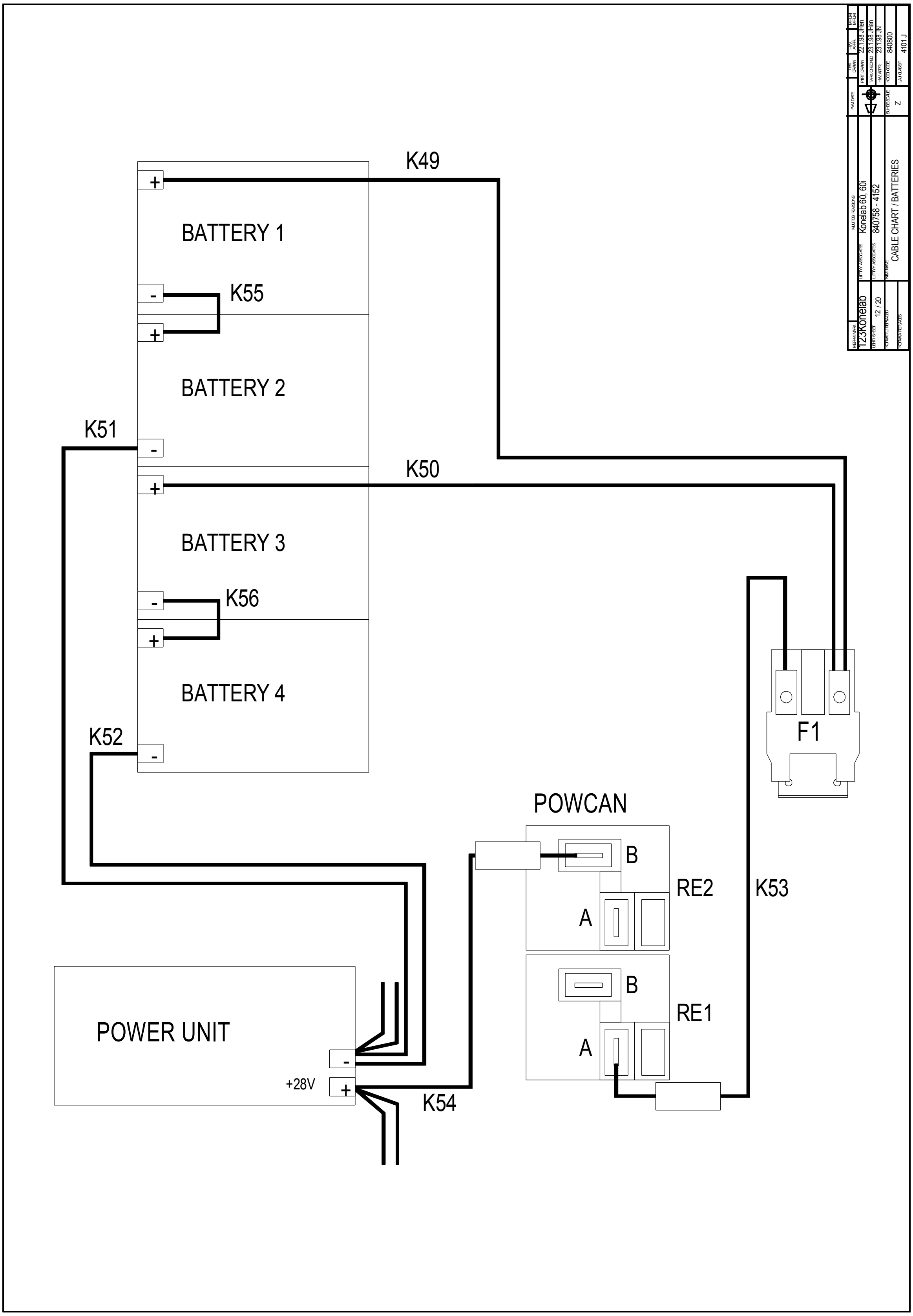


Figure 3-12 Batteries (60,60i)

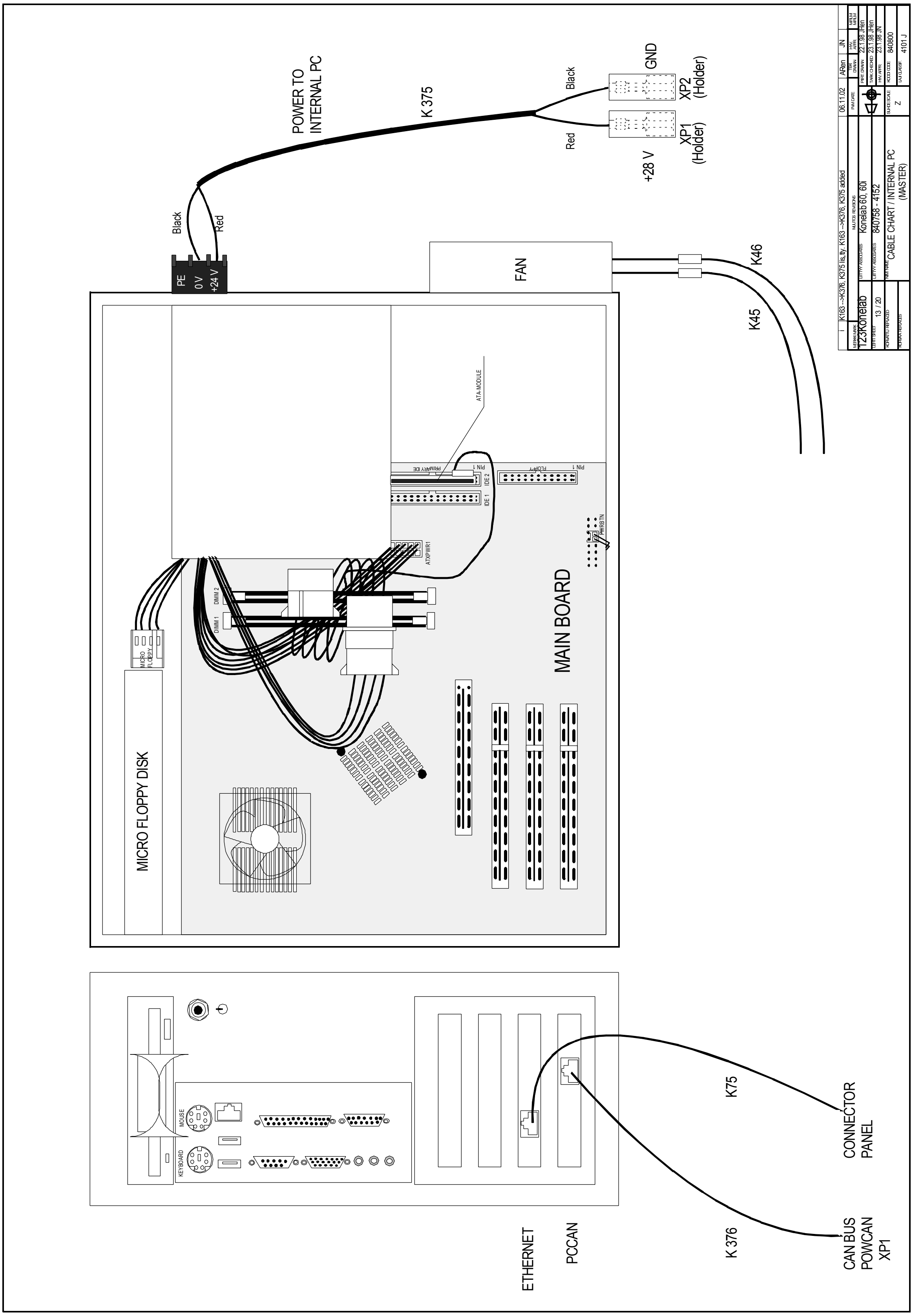


Figure 3-13 Internal PC (master) (60,60i)

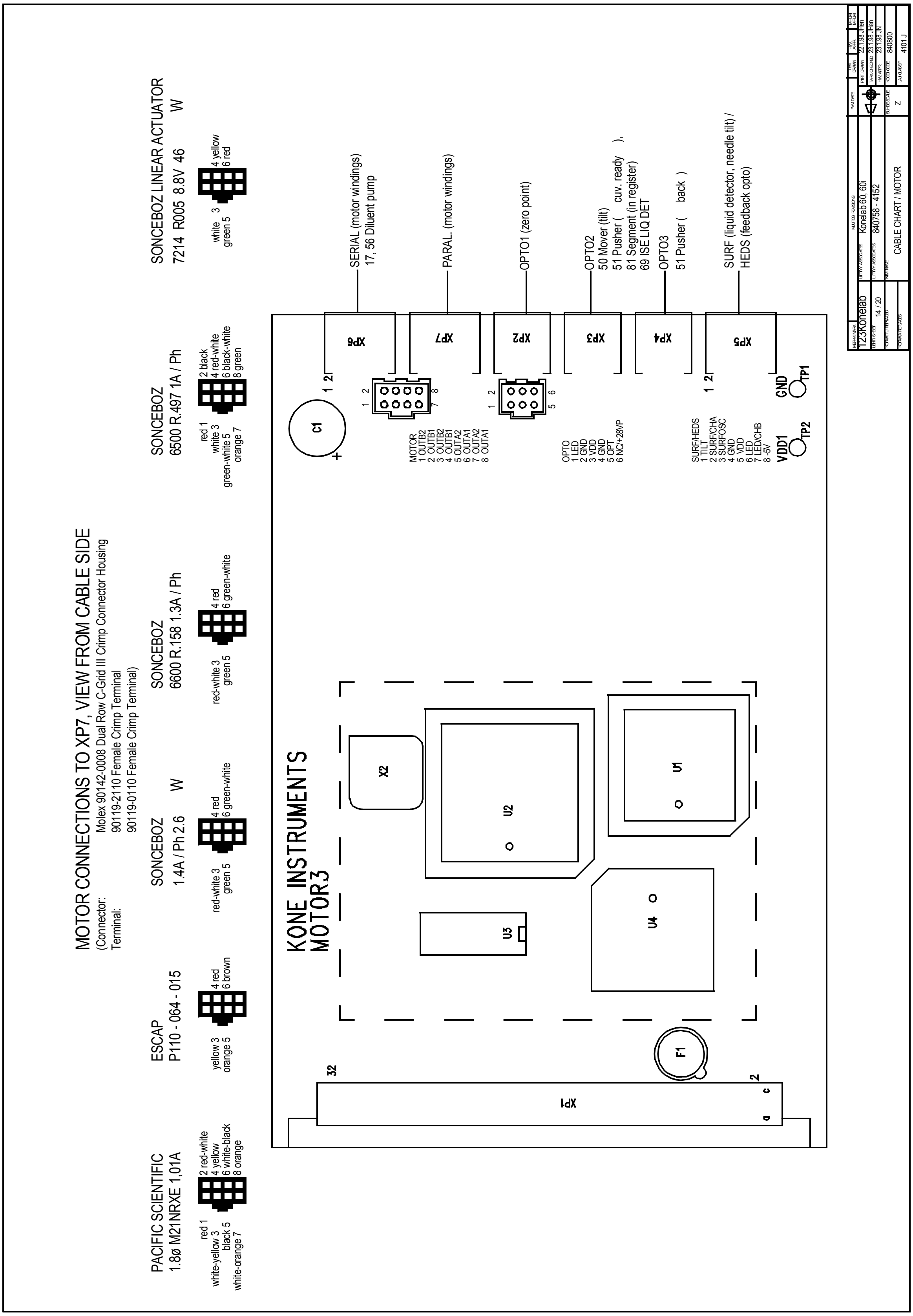


Figure 3-14 Motor (60,60i)

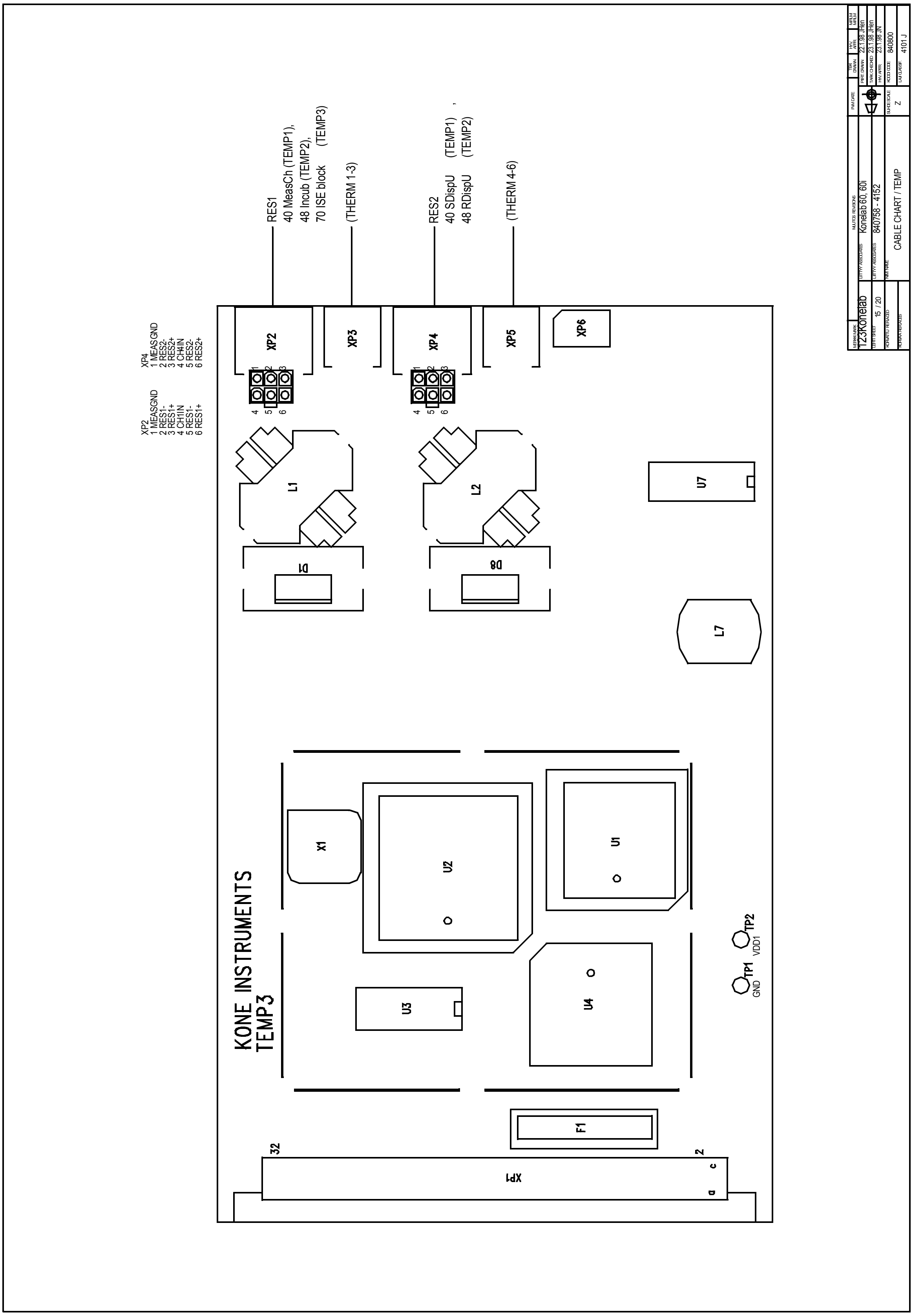


Figure 3-15 Temp (60,60i)

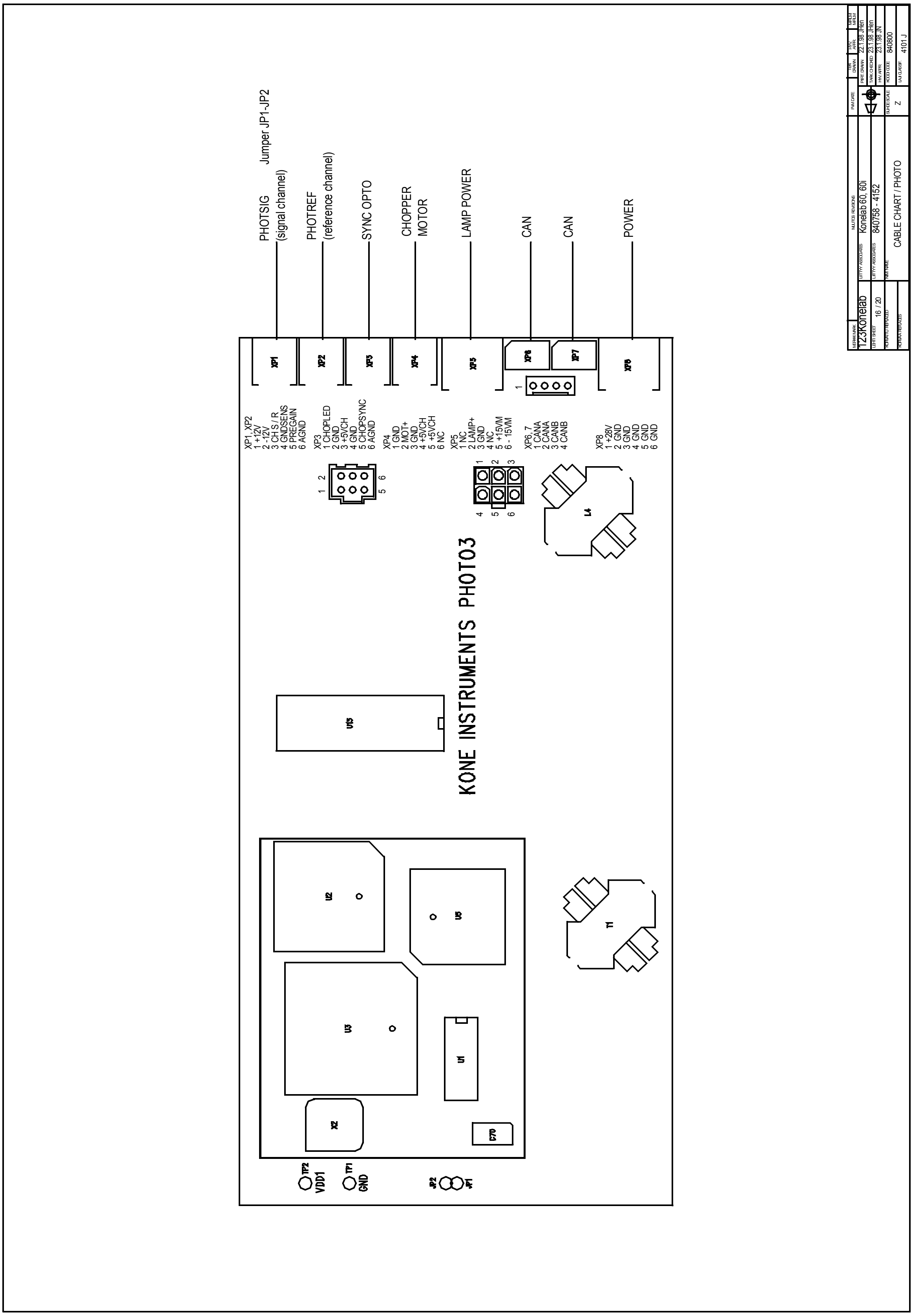


Figure 3-16 Photo (60,60i)

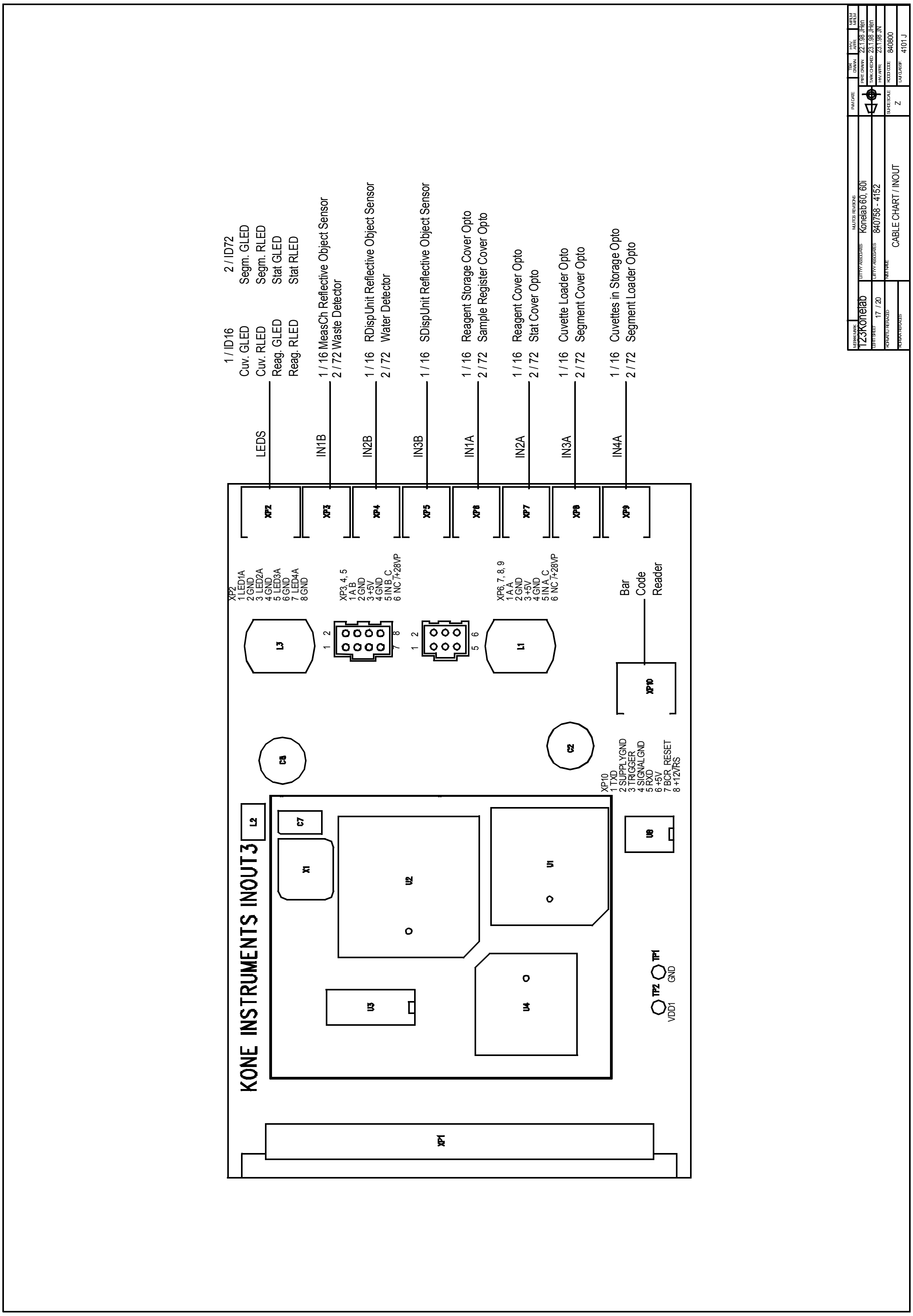


Figure 3-17 Inout (60,60i)

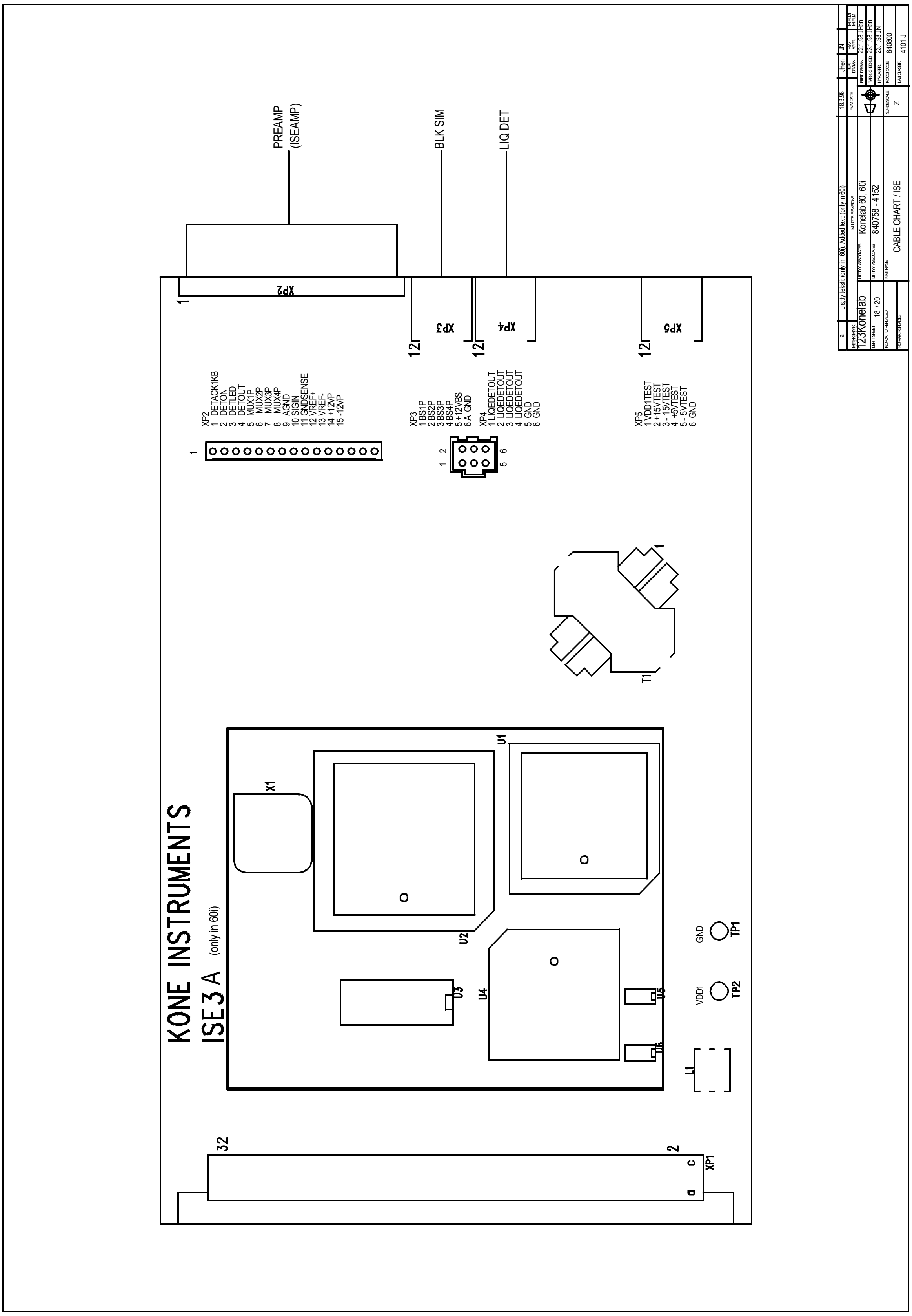
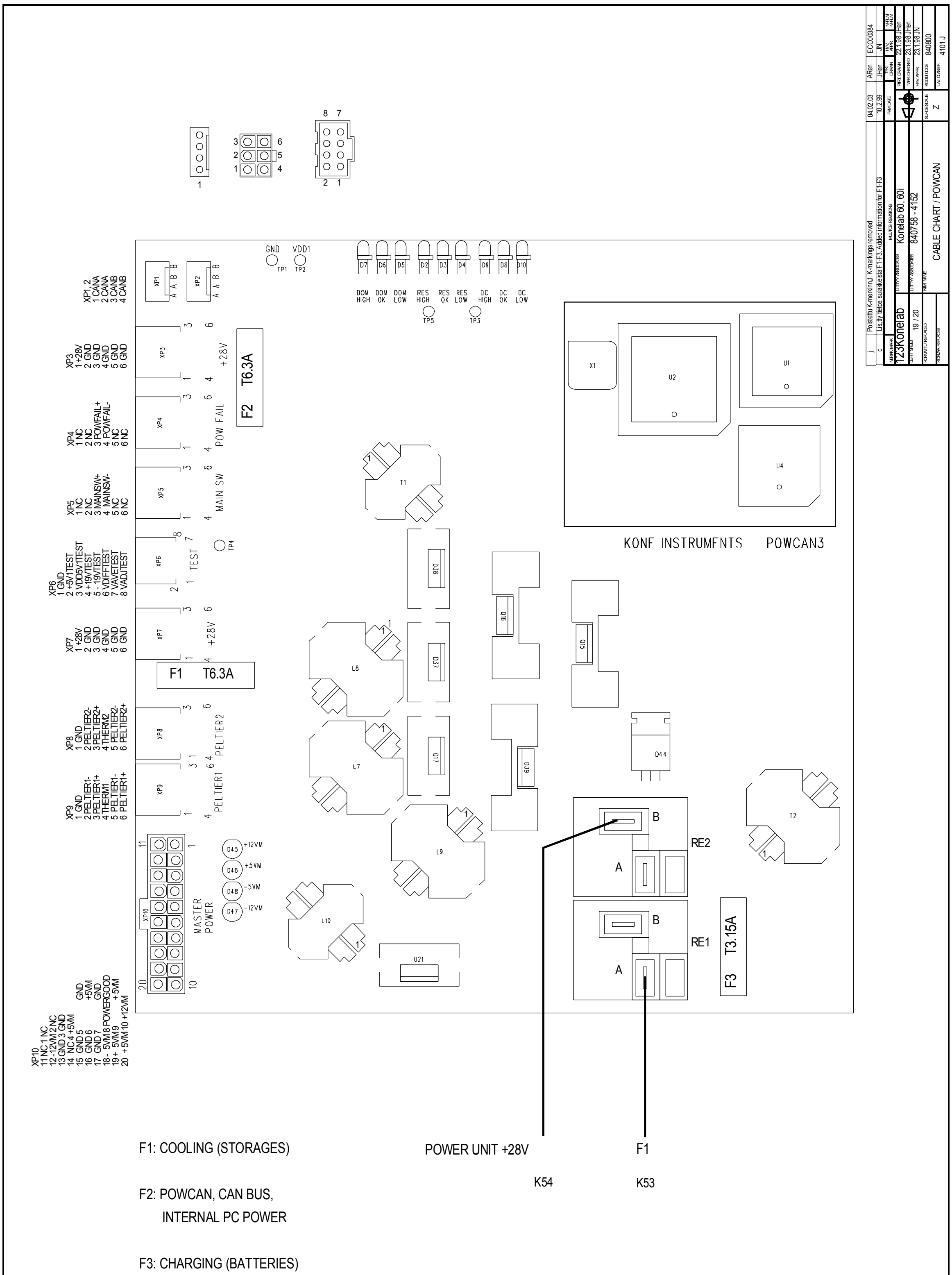


Figure 3-18 ISE (60,60i)



F1: COOLING (STORAGES)

F2: POWCAN, CAN BUS,
INTERNAL PC POWER

F3: CHARGING (BATTERIES)

Figure 3-19 Powcan (60,60i)

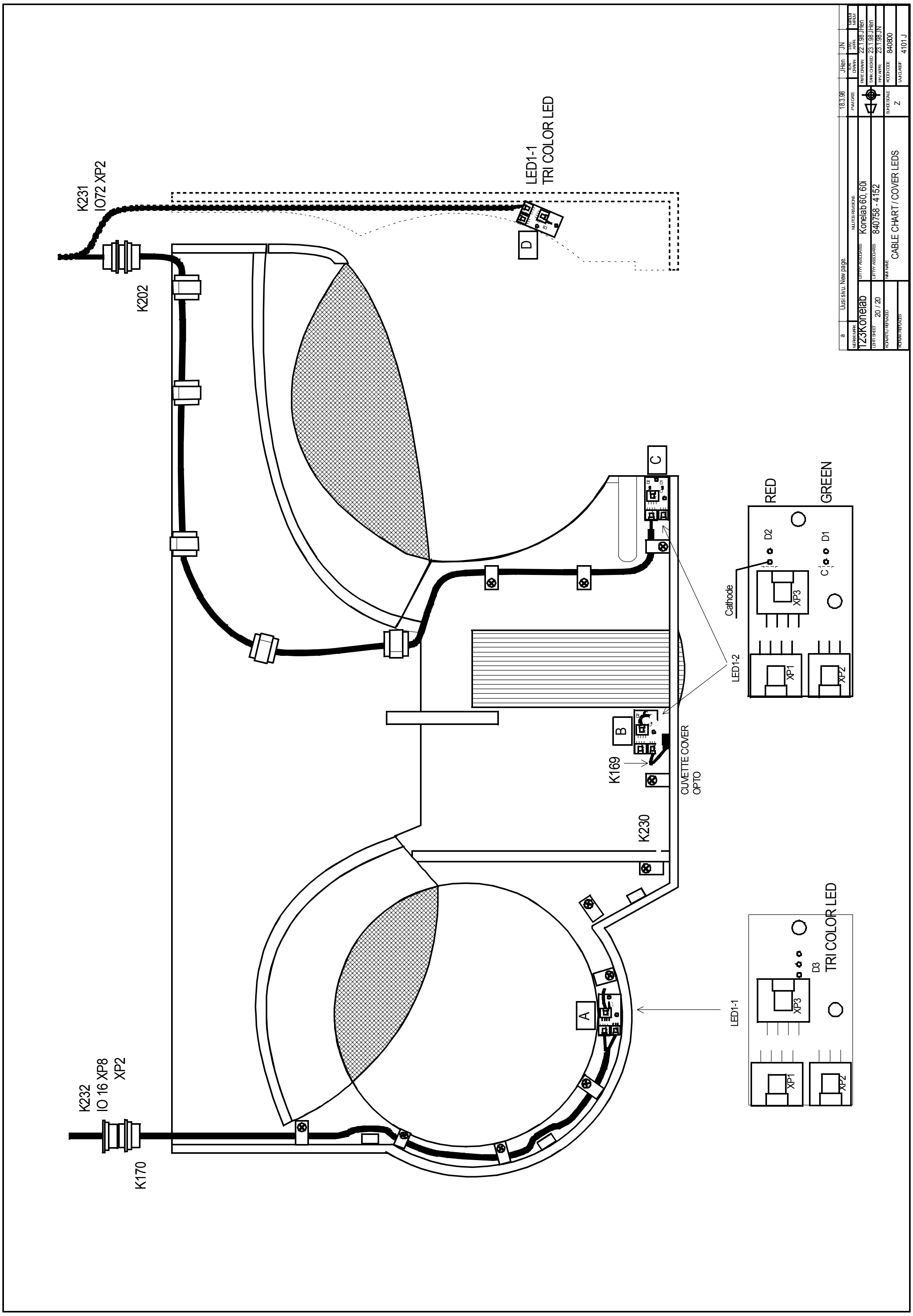


Figure 3-20 Cover leds (60,60i)

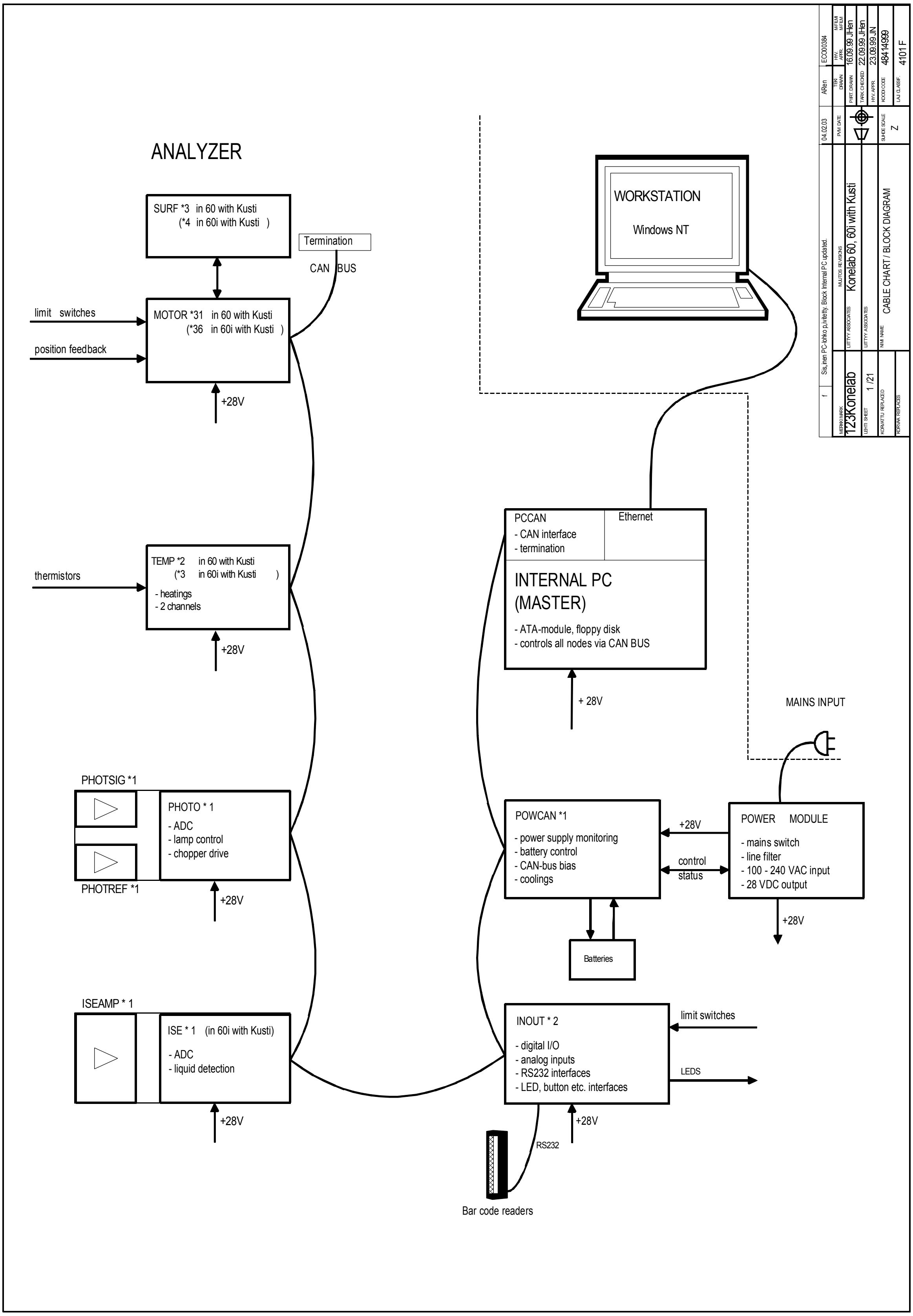


Figure 3-21 Block diagram (60,60i Kusti)

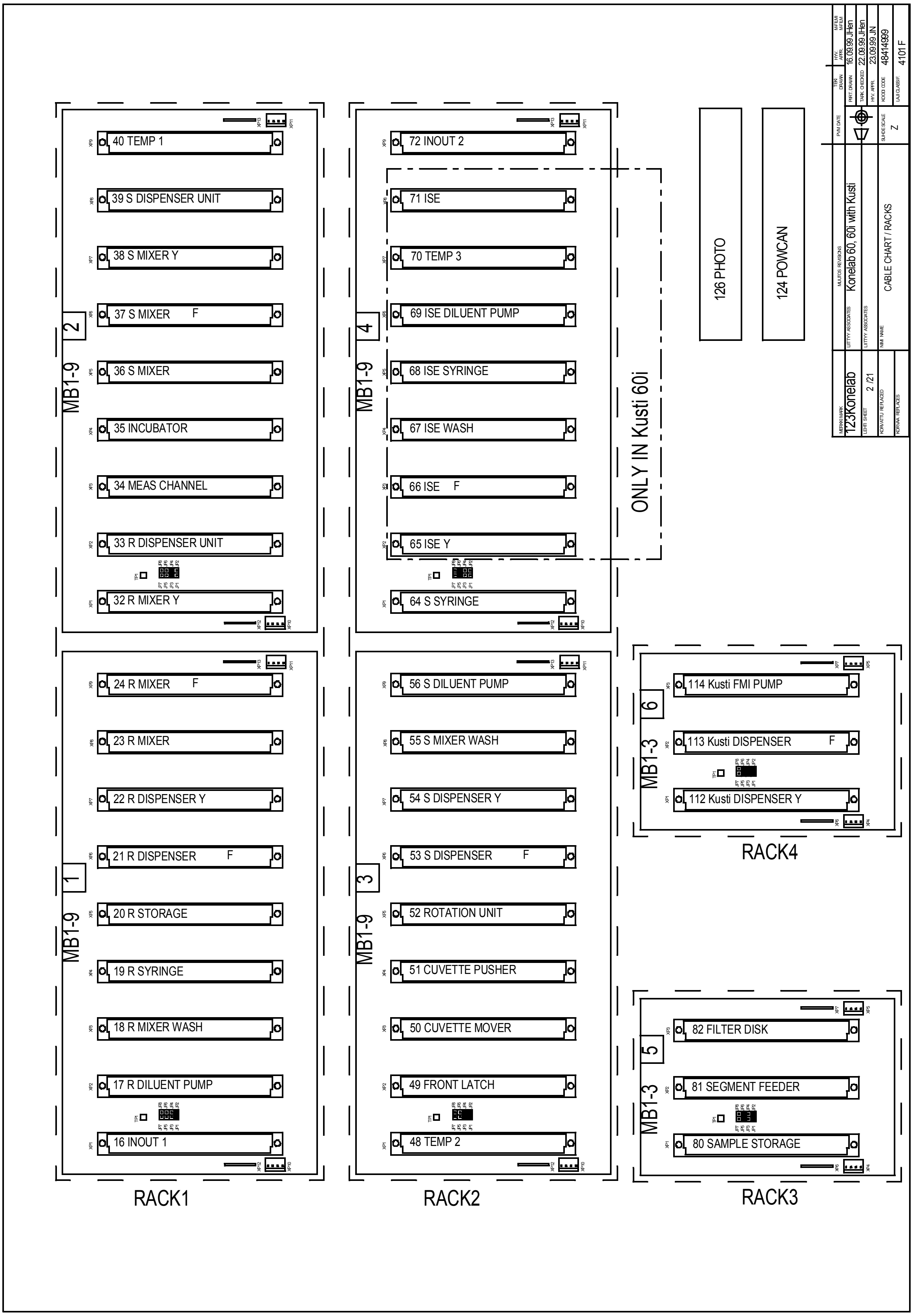


Figure 3-22 Racks (60,60i Kusti)

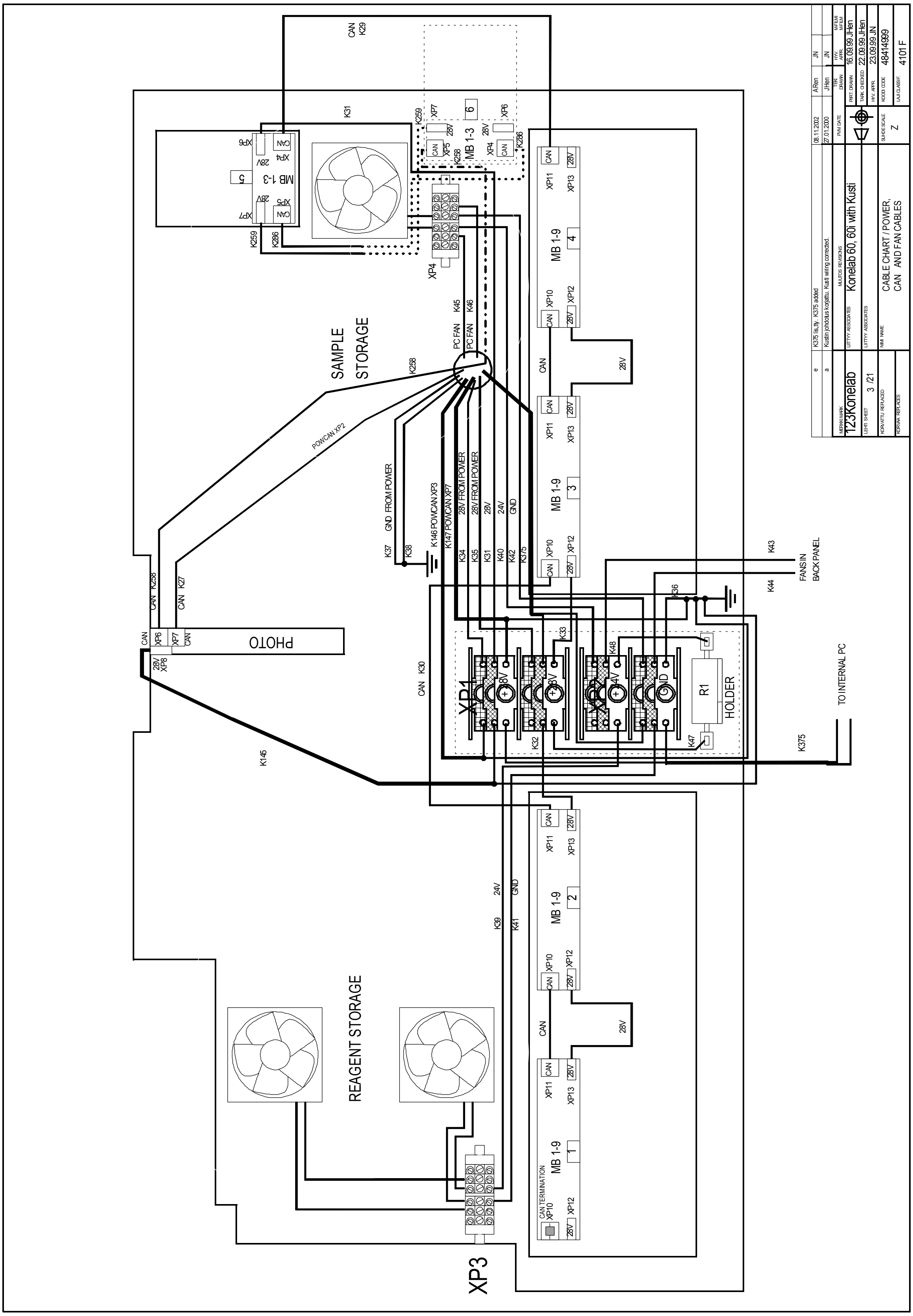


Figure 3-23 Power, can and fan cables (60,60i Kusti)

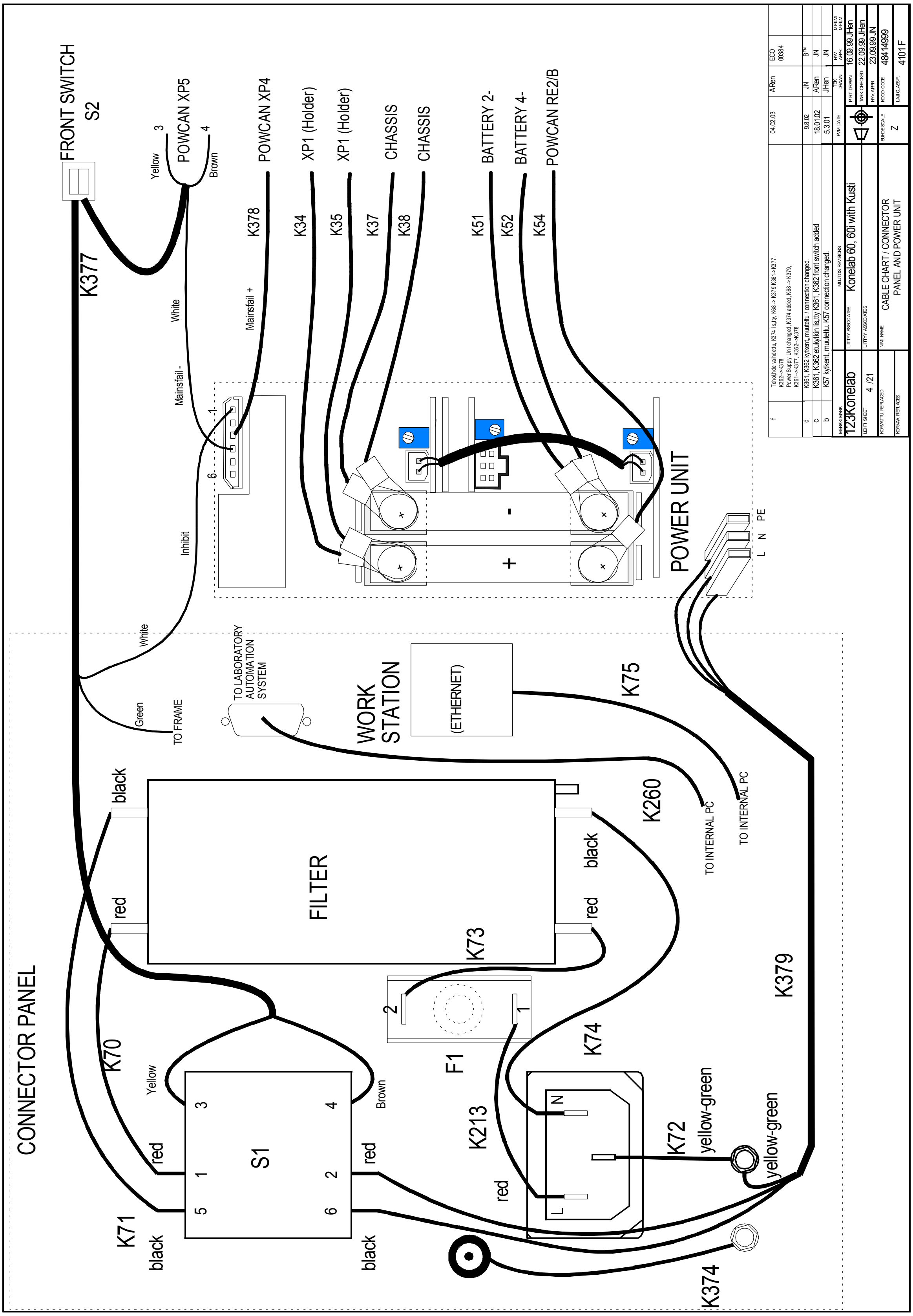


Figure 3-24 Connector panel and power unit (60,60i Kusti)

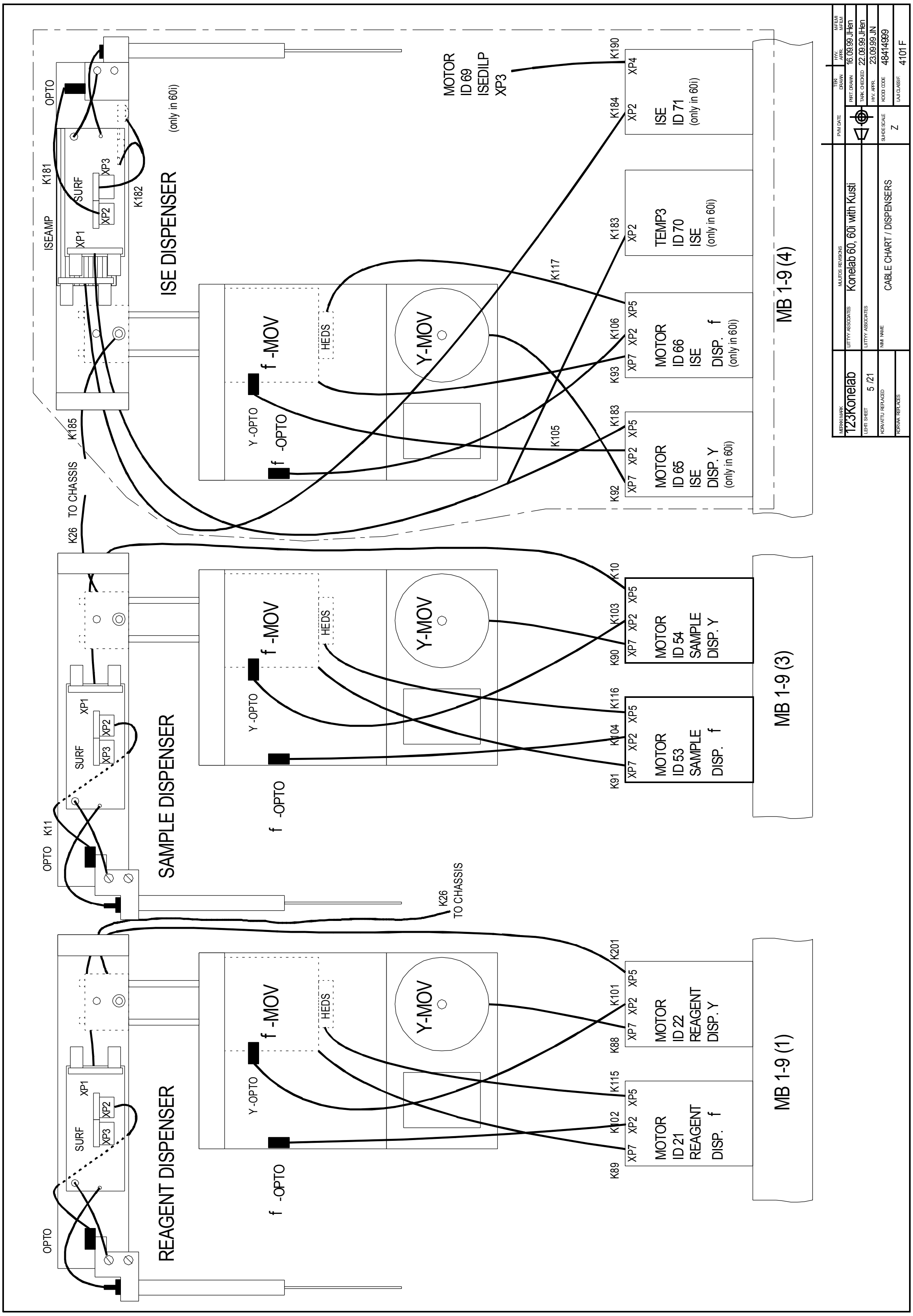


Figure 3-25 Dispensers (60,60i Kusti)

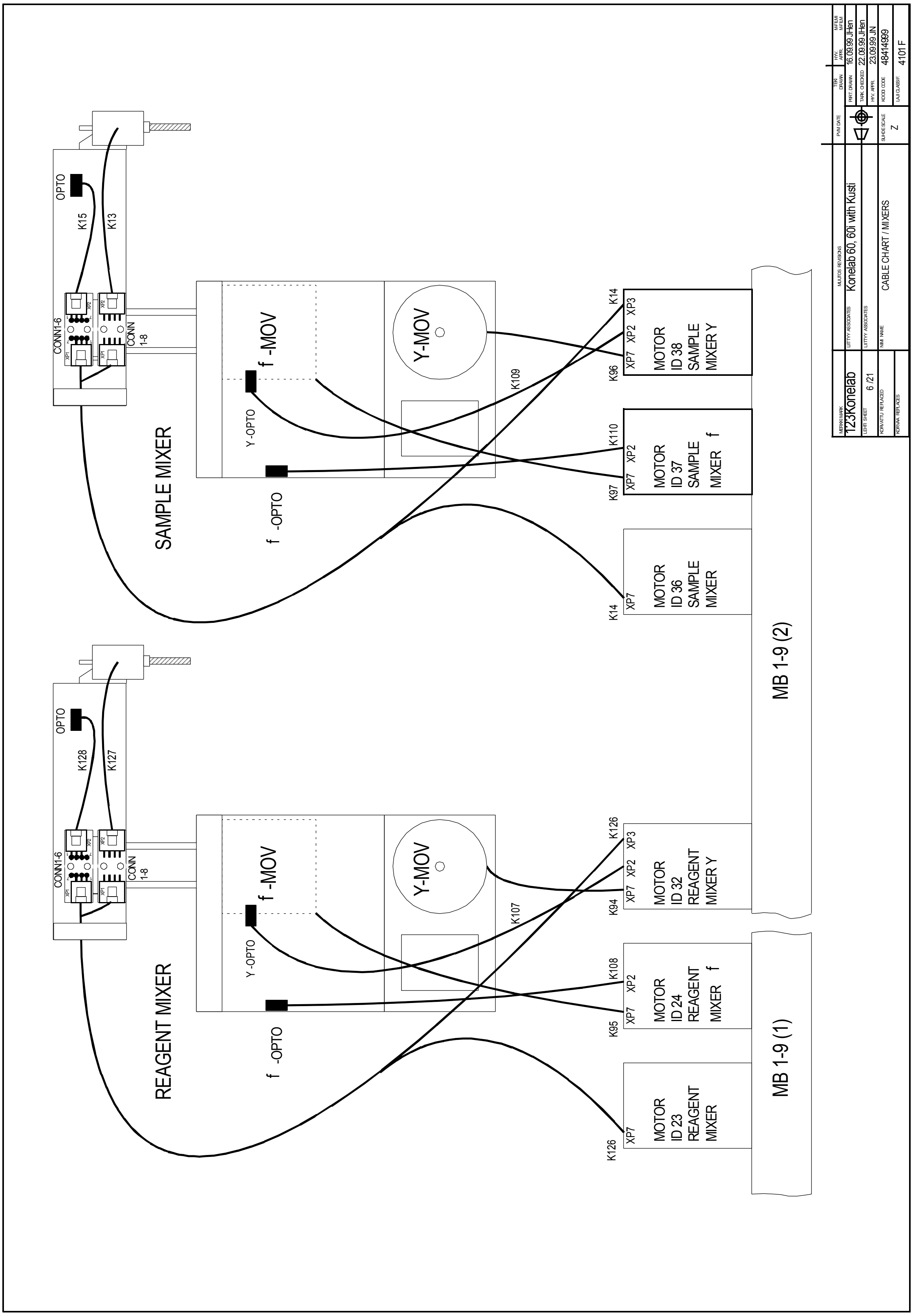


Figure 3-26 Mixers (60,60i Kusti)

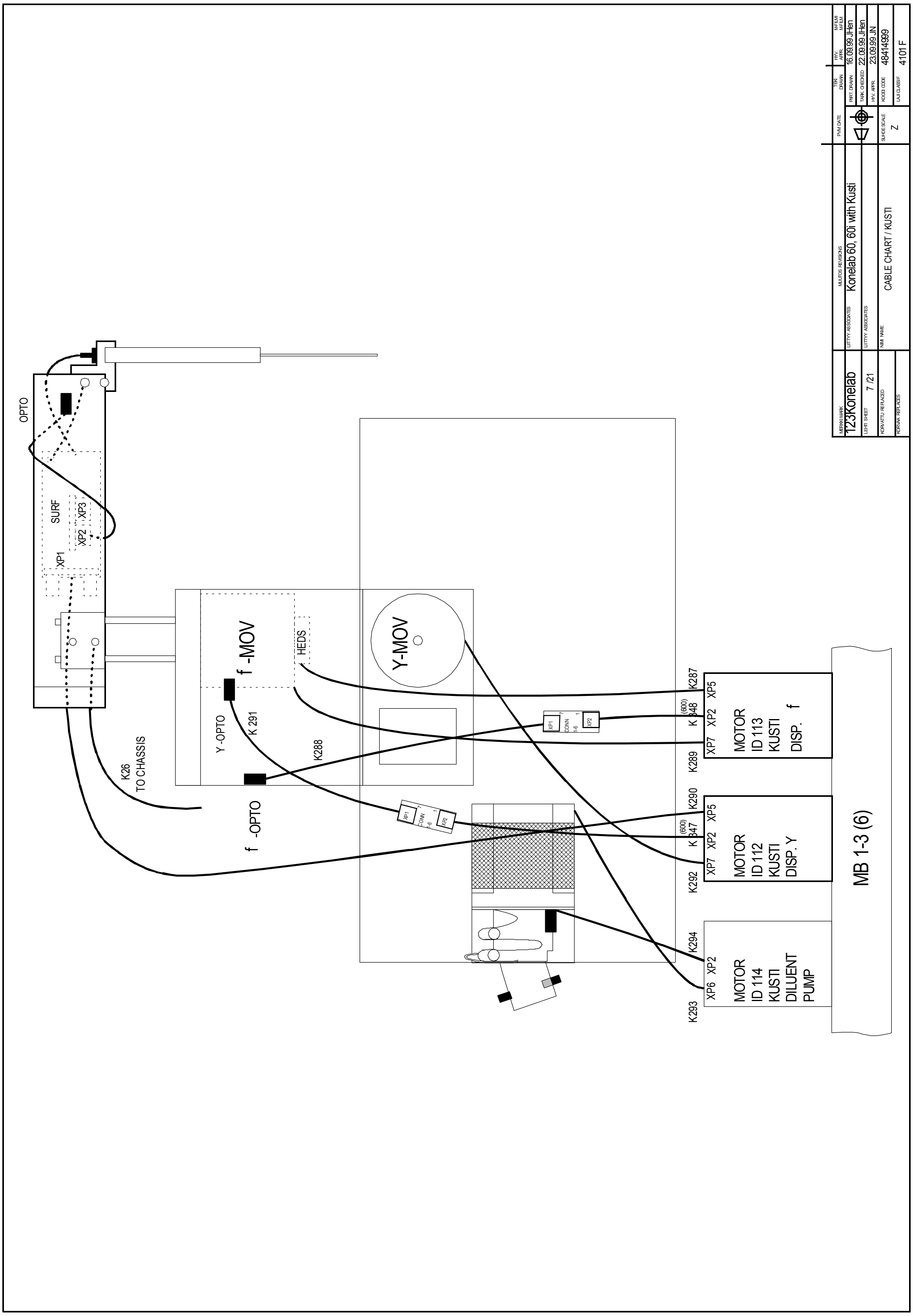


Figure 3-27 Kusti (60,60i Kusti)

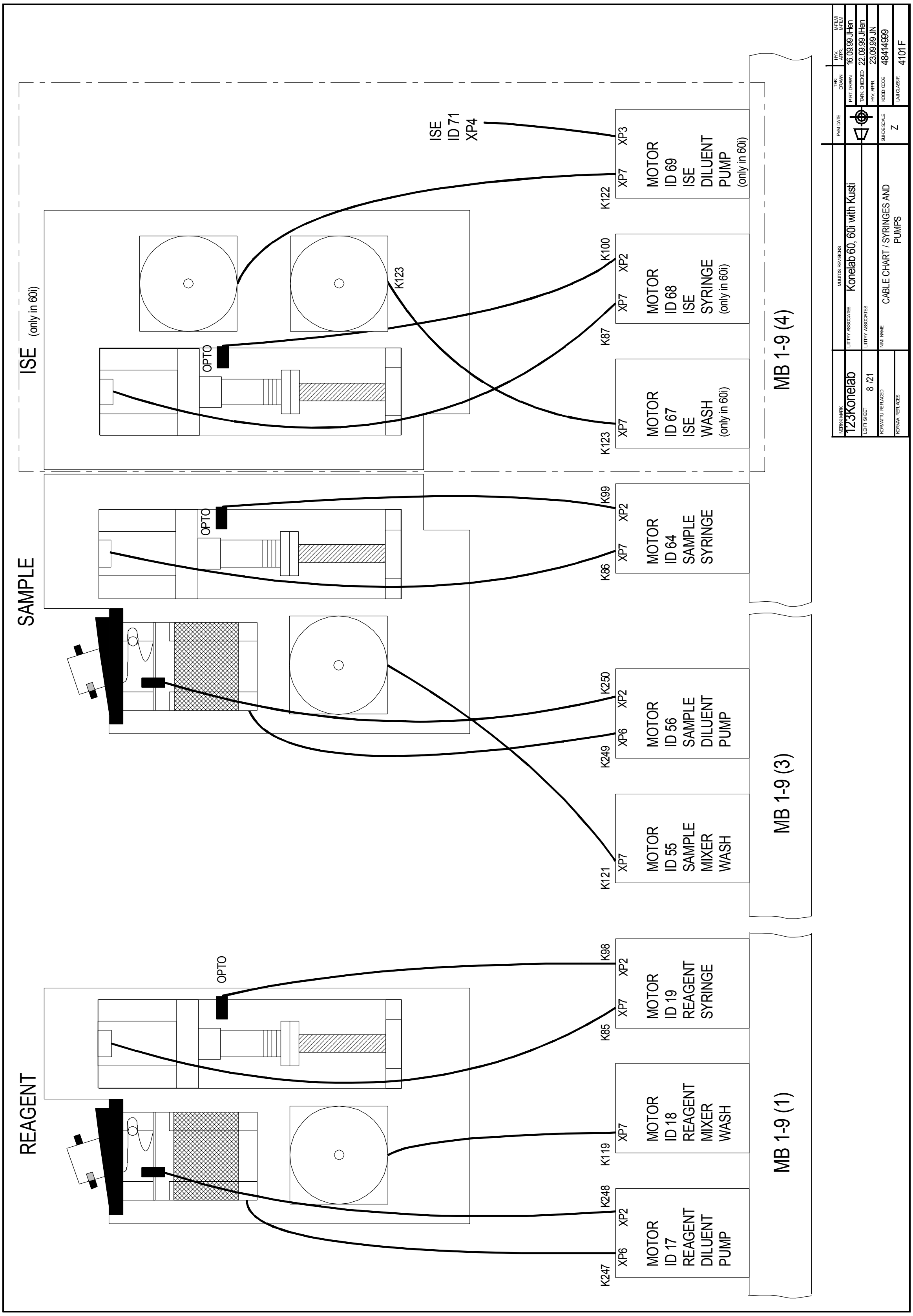


Figure 3-28 Syringes and pumps (60,60i Kusti)

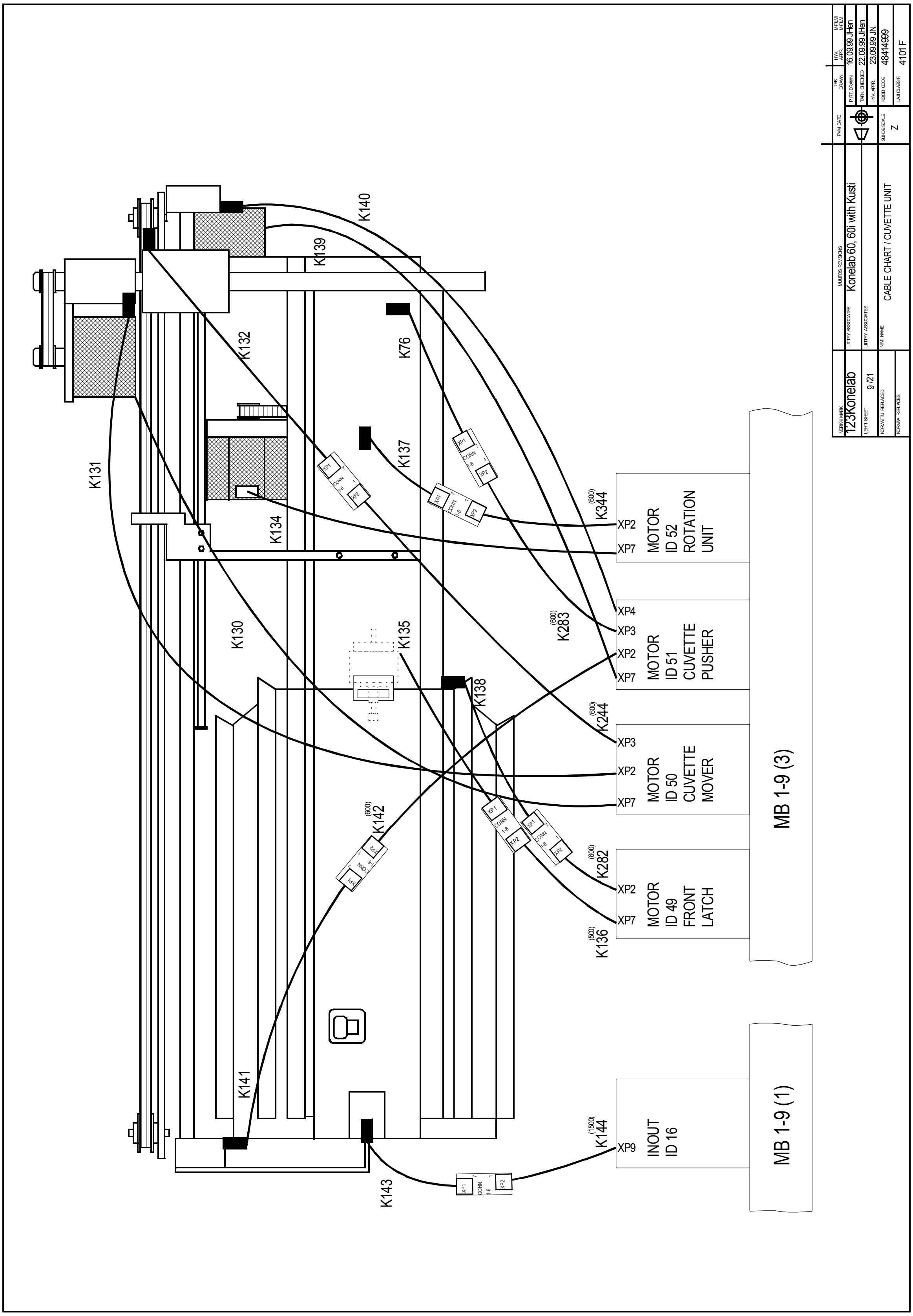


Figure 3-29 Cuvette unit (60,60i Kusti)

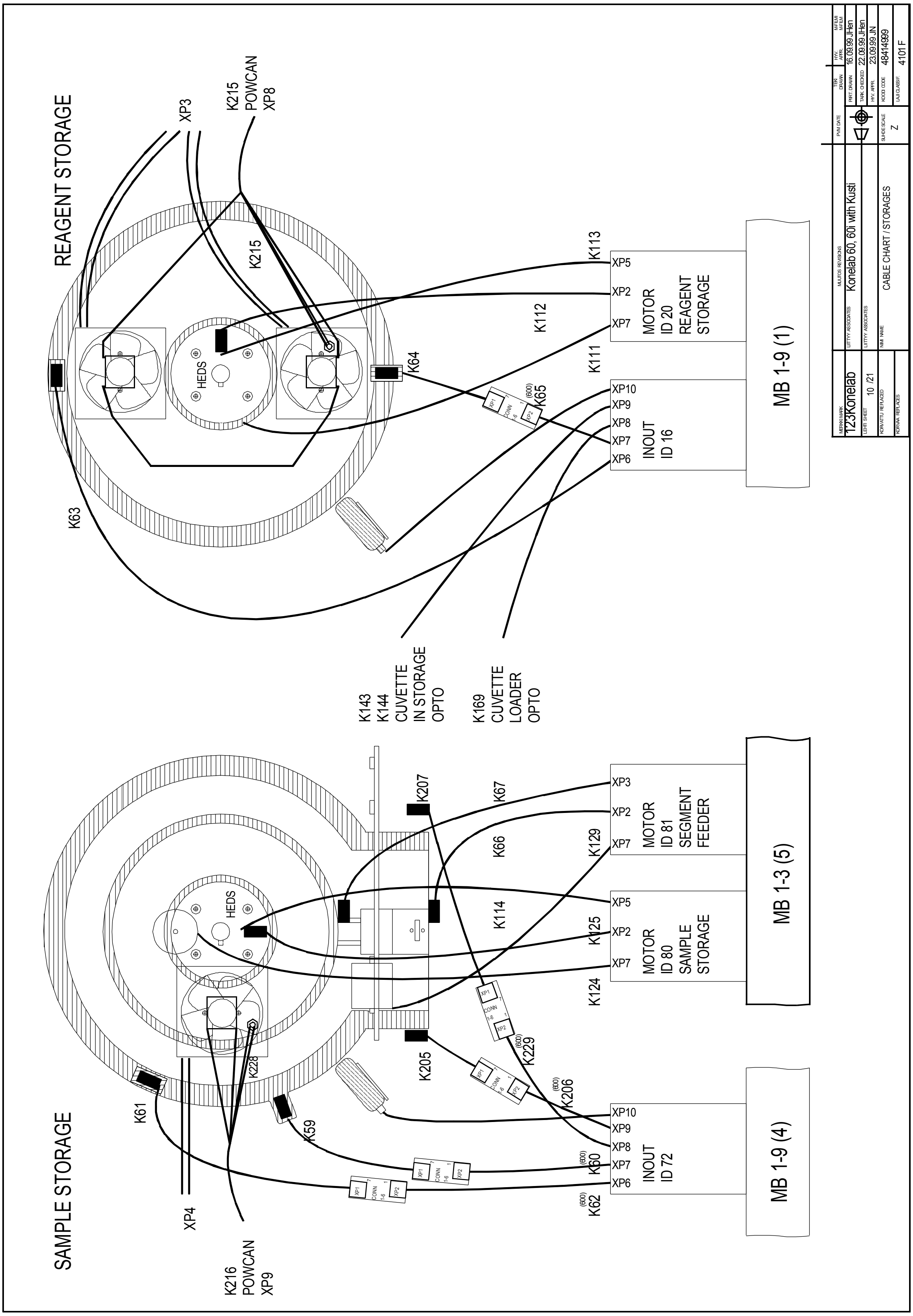


Figure 3-30 Storages (60,60i Kusti)

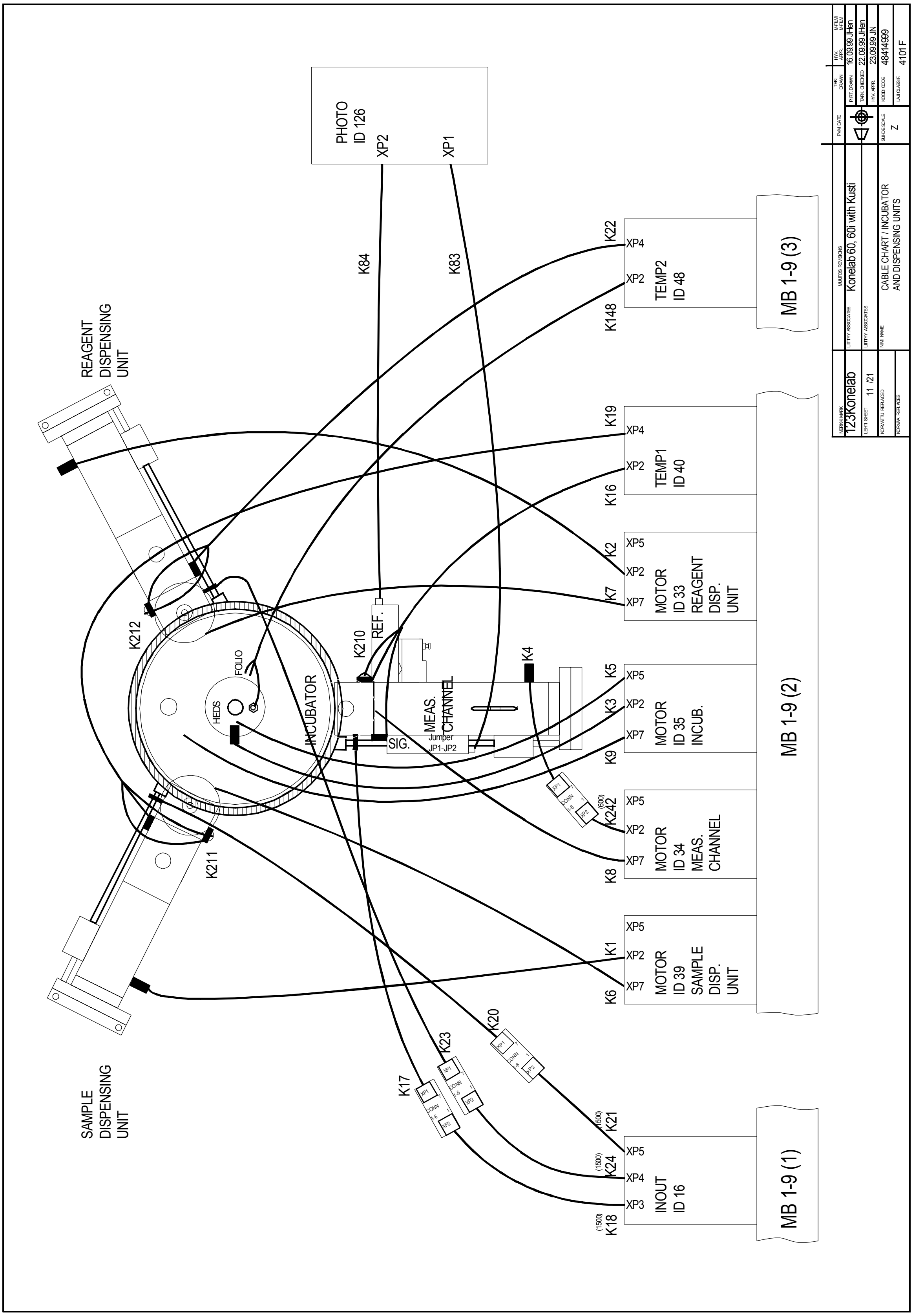


Figure 3-31 Incubator and dispensing units (60,60i Kusti)

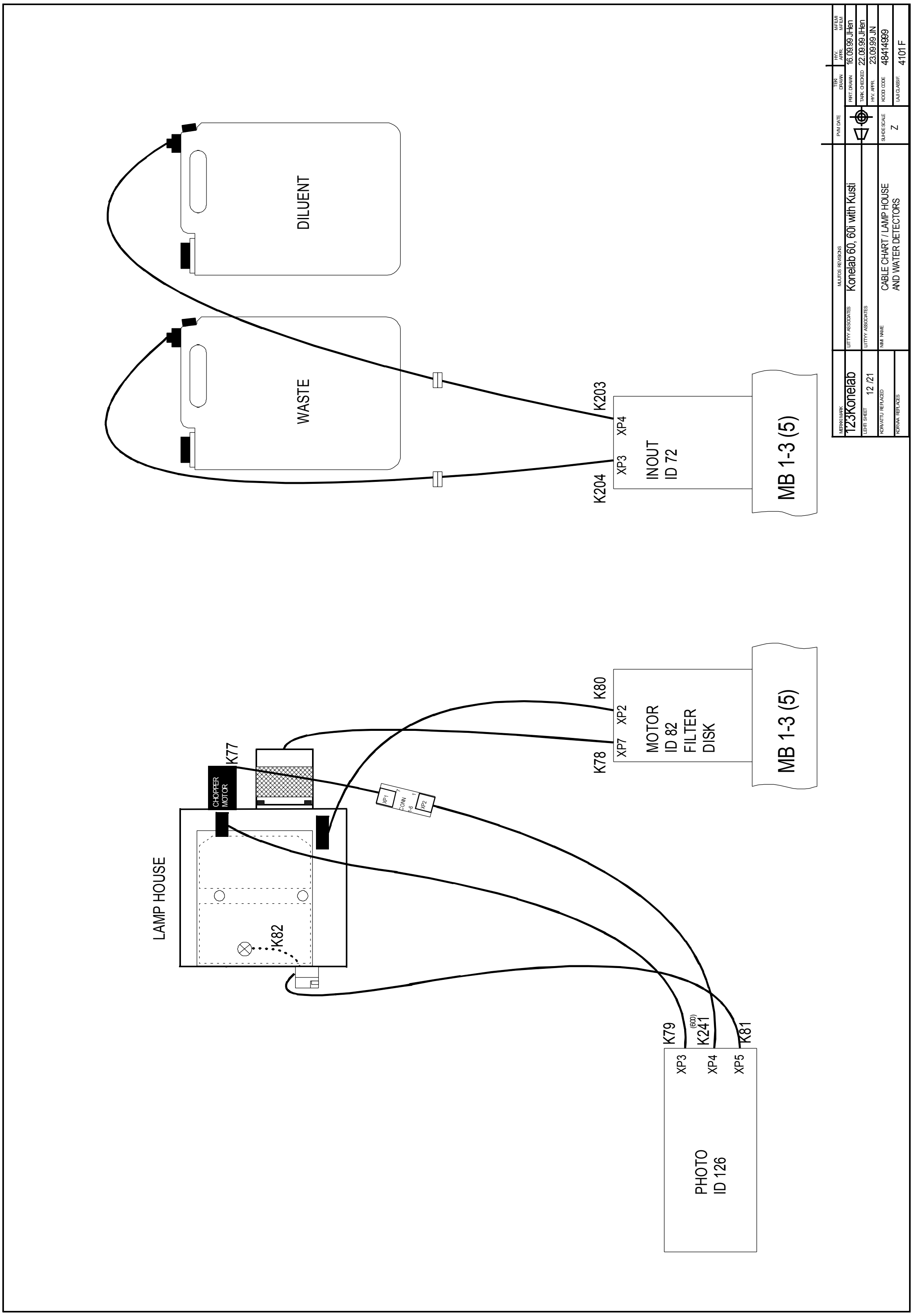


Figure 3-32 Lamp house and water detectors (60,60i Kusti)

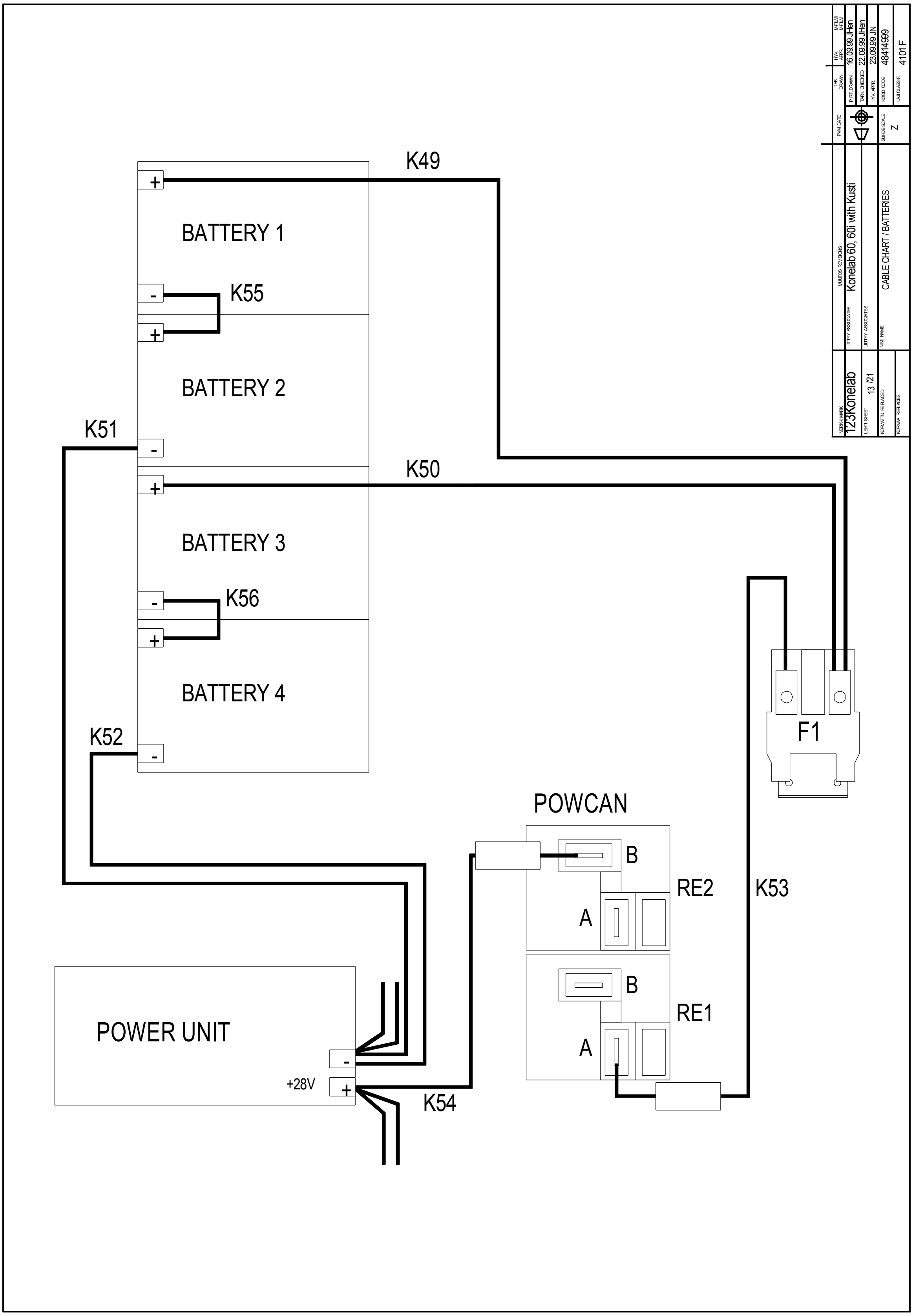


Figure 3-33 Batteries (60,60i Kusti)

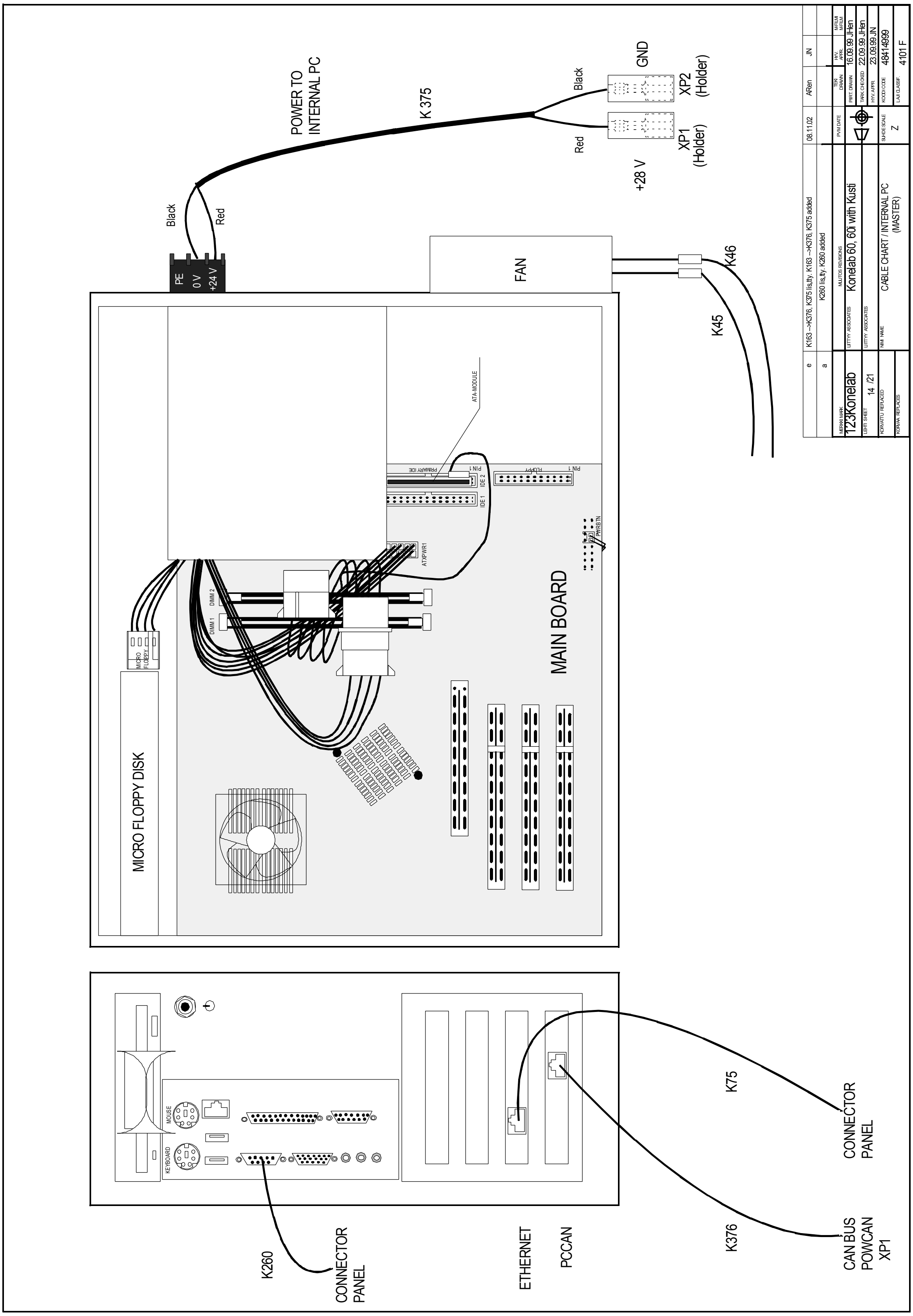


Figure 3-34 Internal PC (master) (60,60i Kusti)

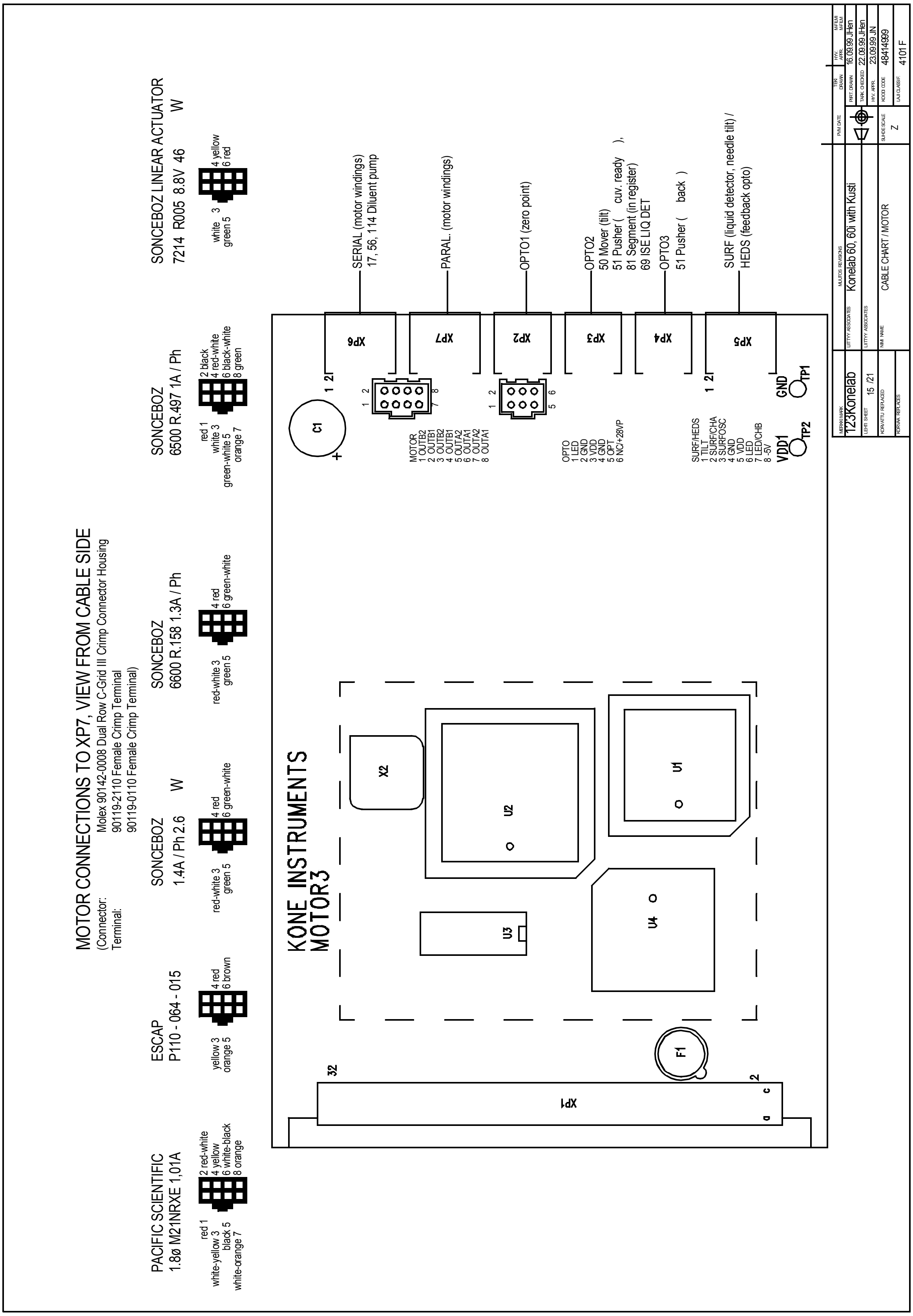


Figure 3-35 Motor (60,60i Kusti)

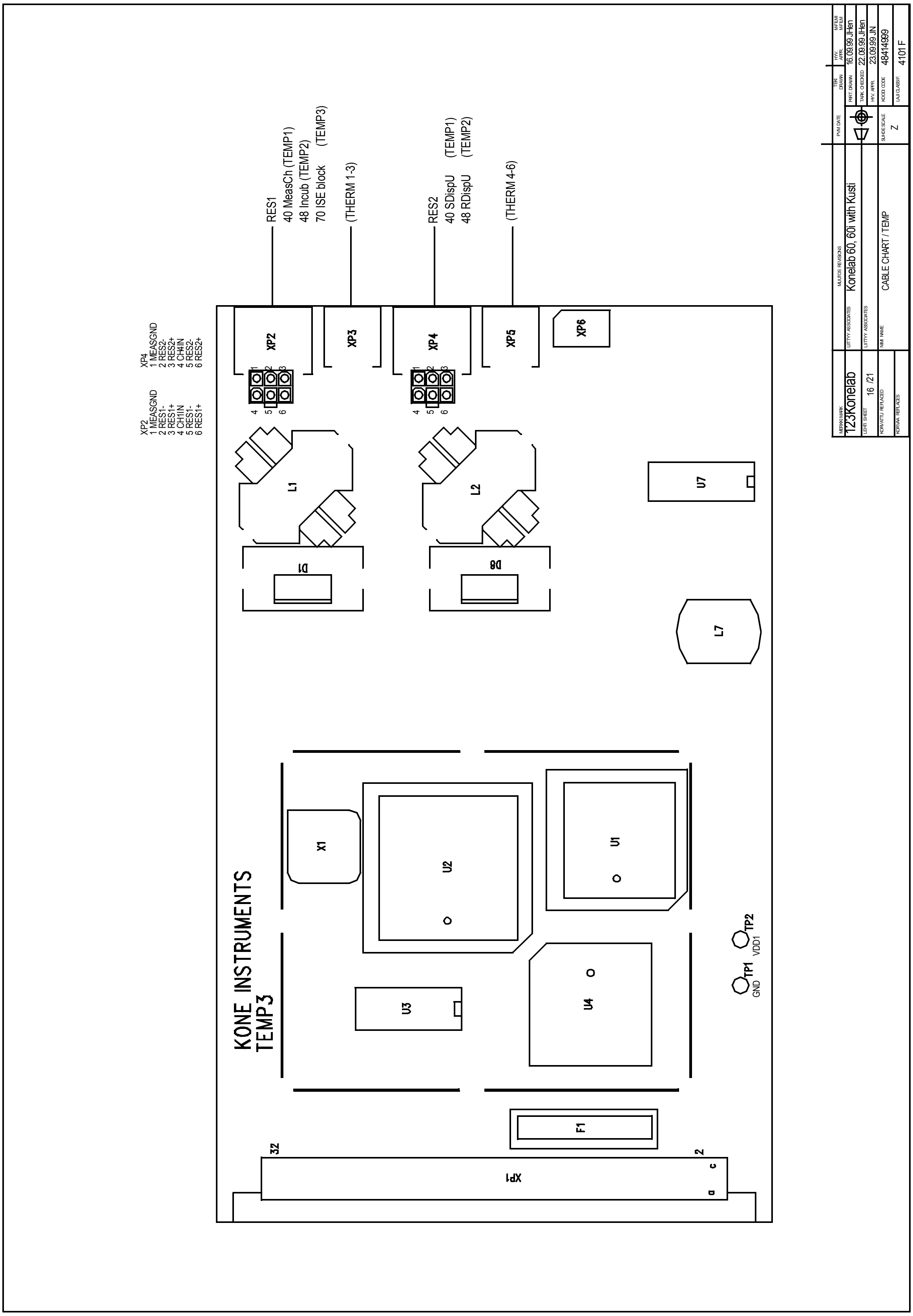


Figure 3-36 Temp (60,60i Kusti)

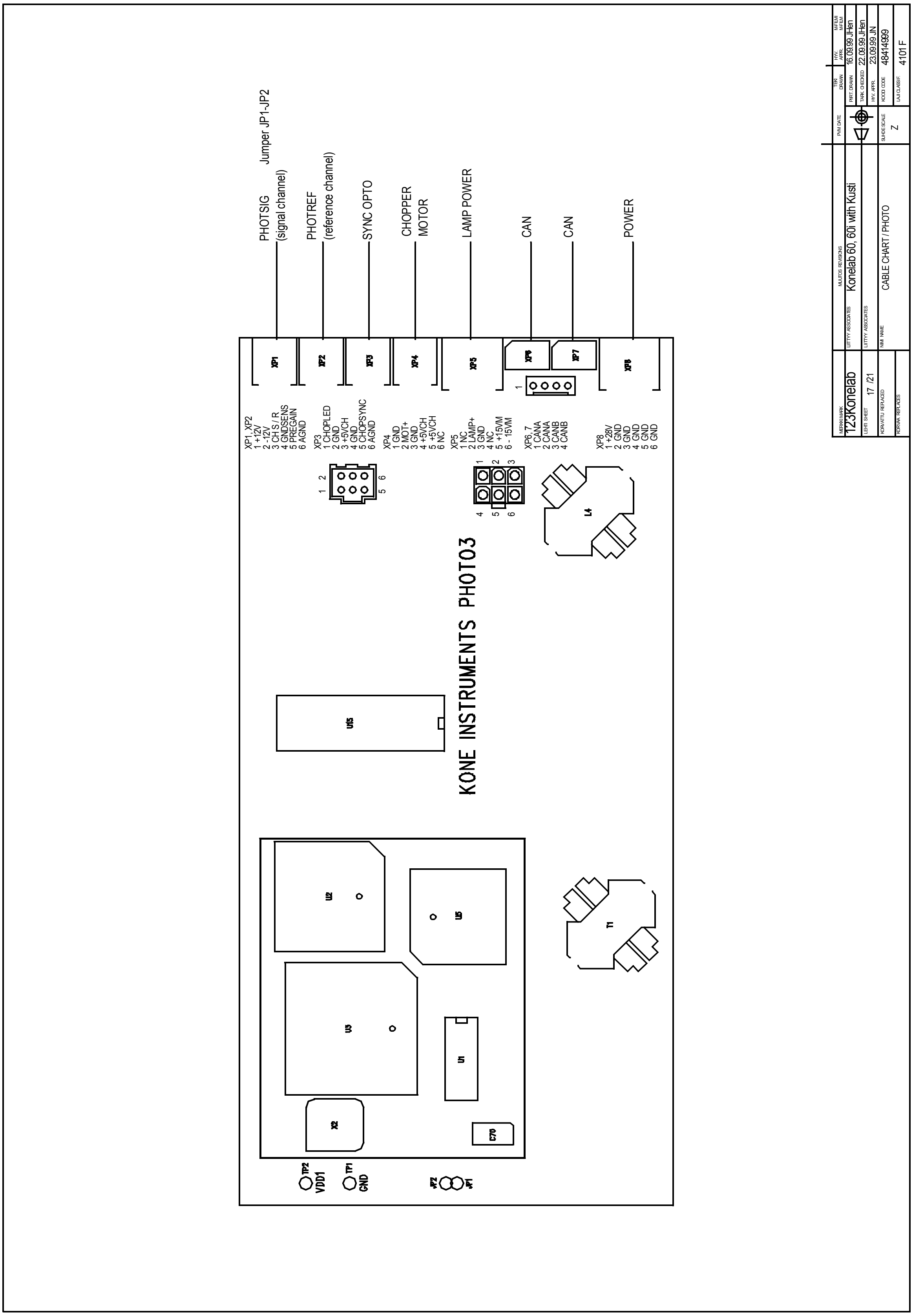


Figure 3-37 Photo (60,60i Kusti)

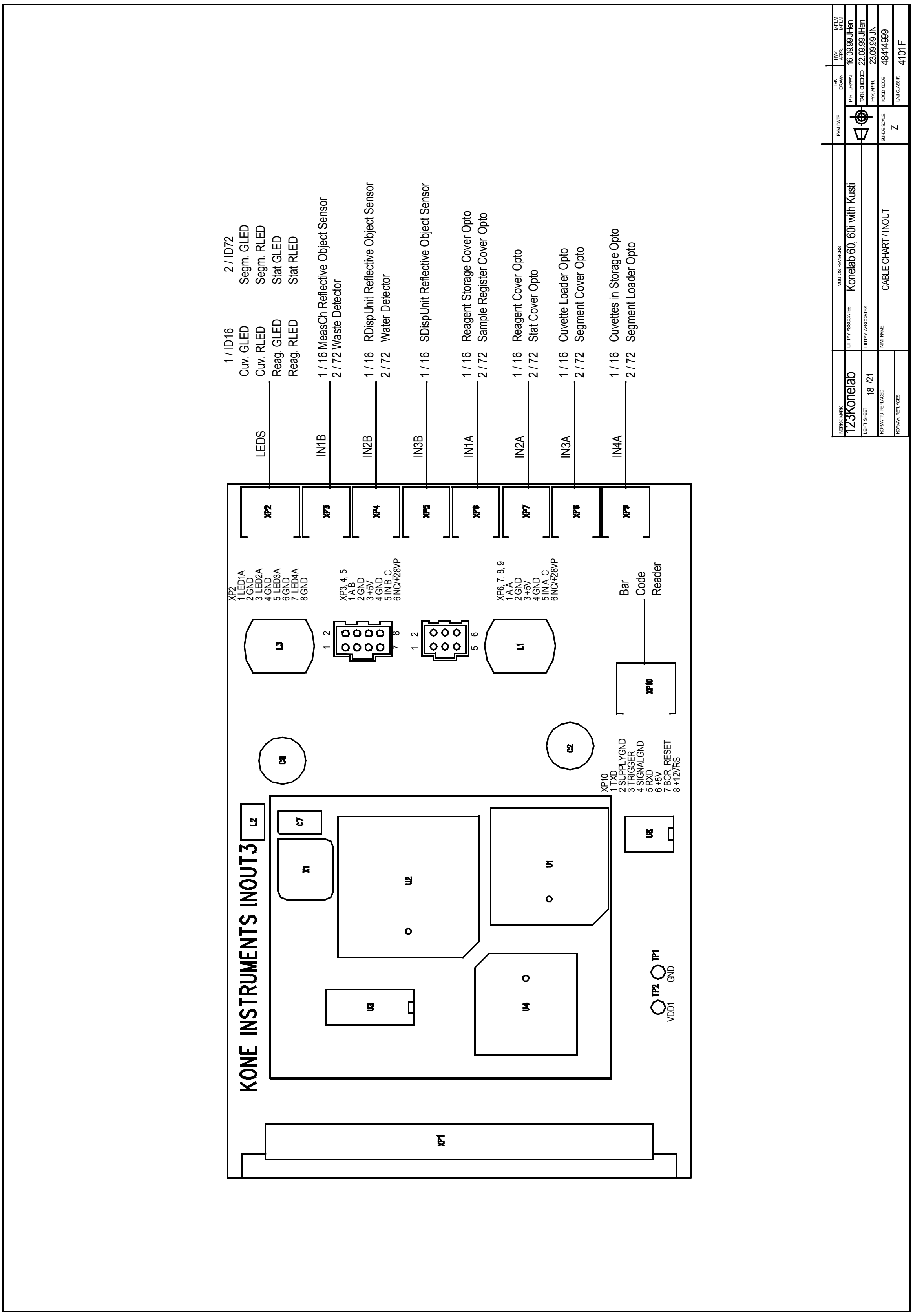


Figure 3-38 INOUT (60,60i Kusti)

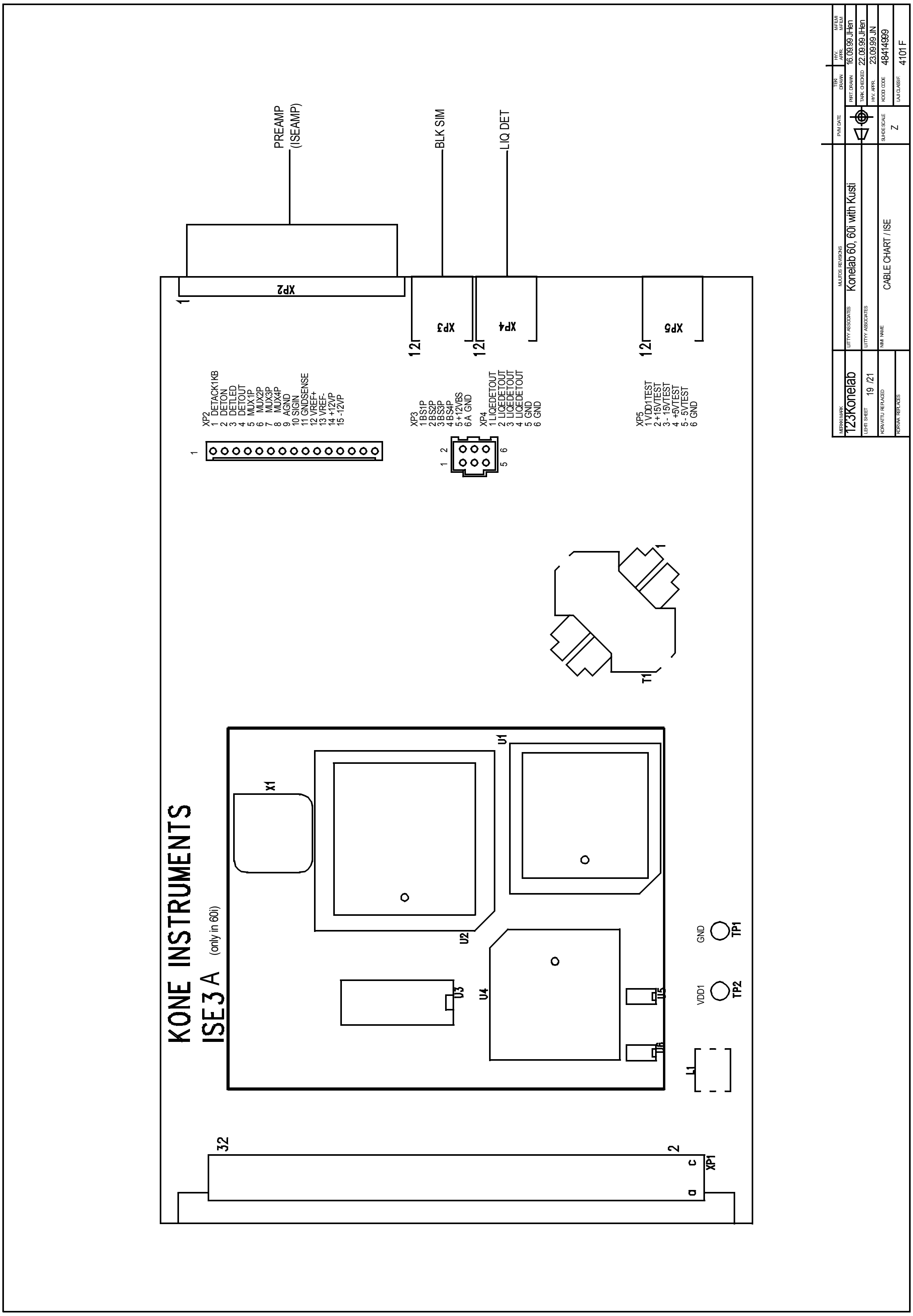


Figure 3-39 ISE (60,60i Kusti)

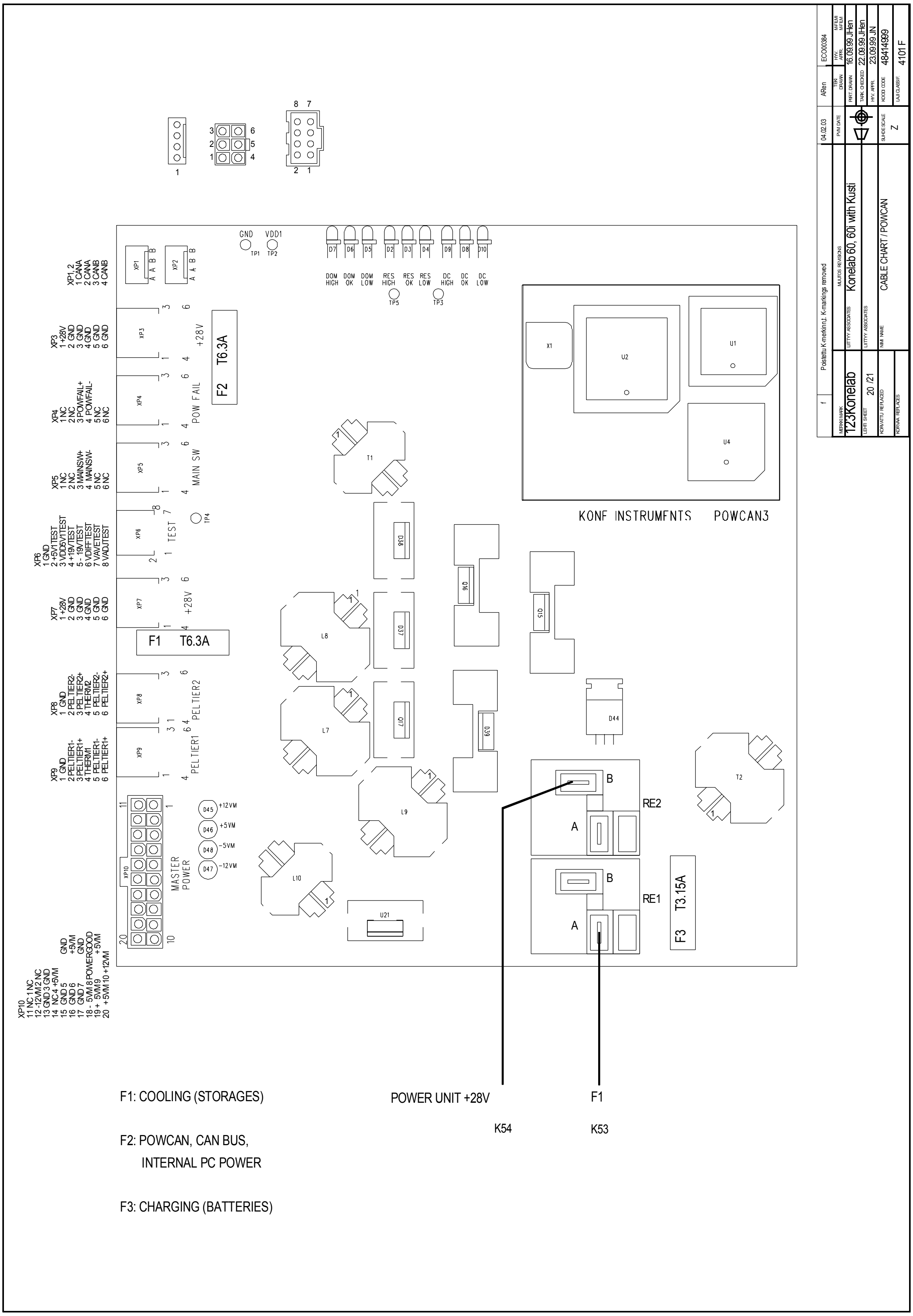


Figure 3-40 Powcan (60,60i Kusti)

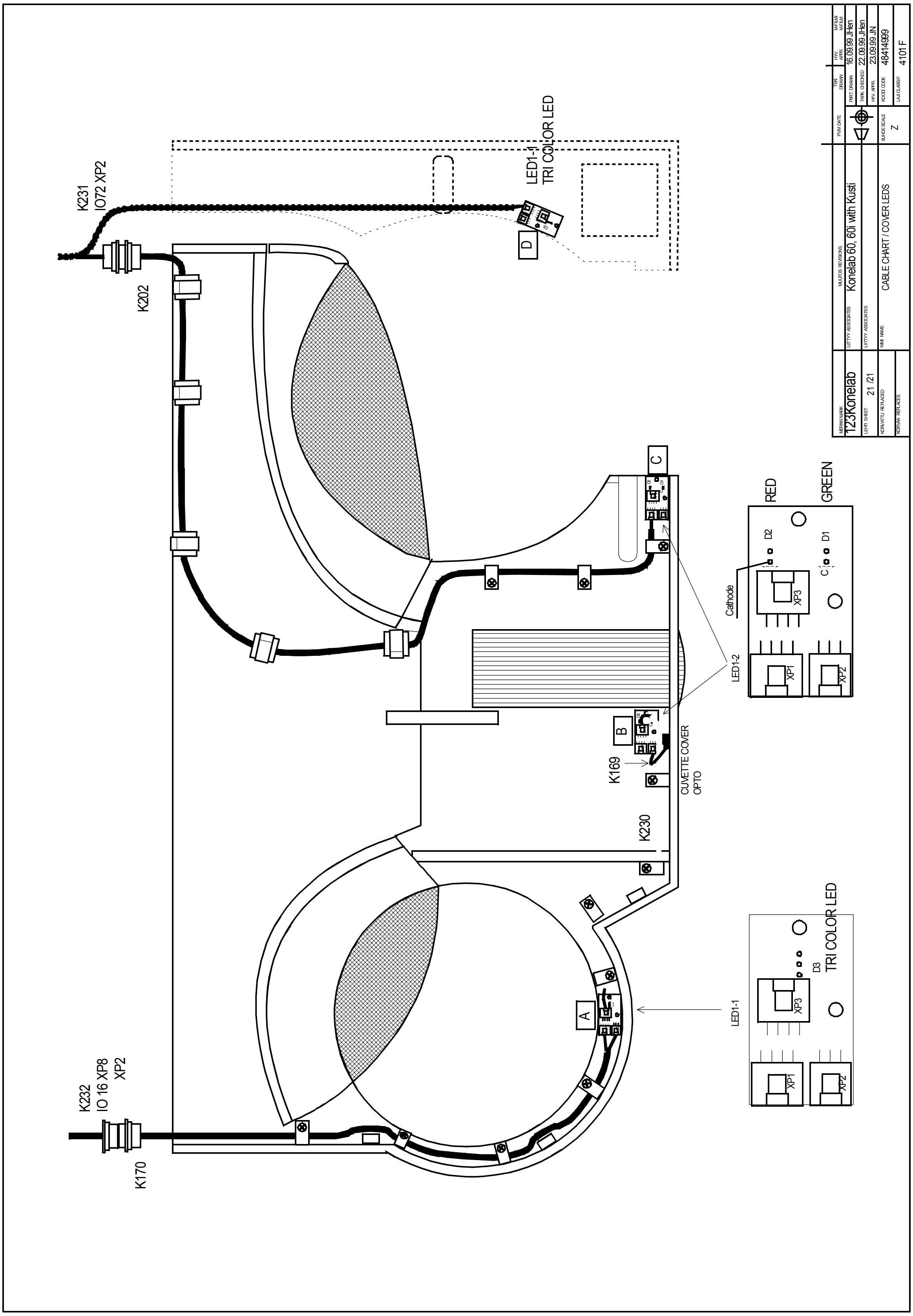


Figure 3-41 Cover leds (60,60i Kusti)

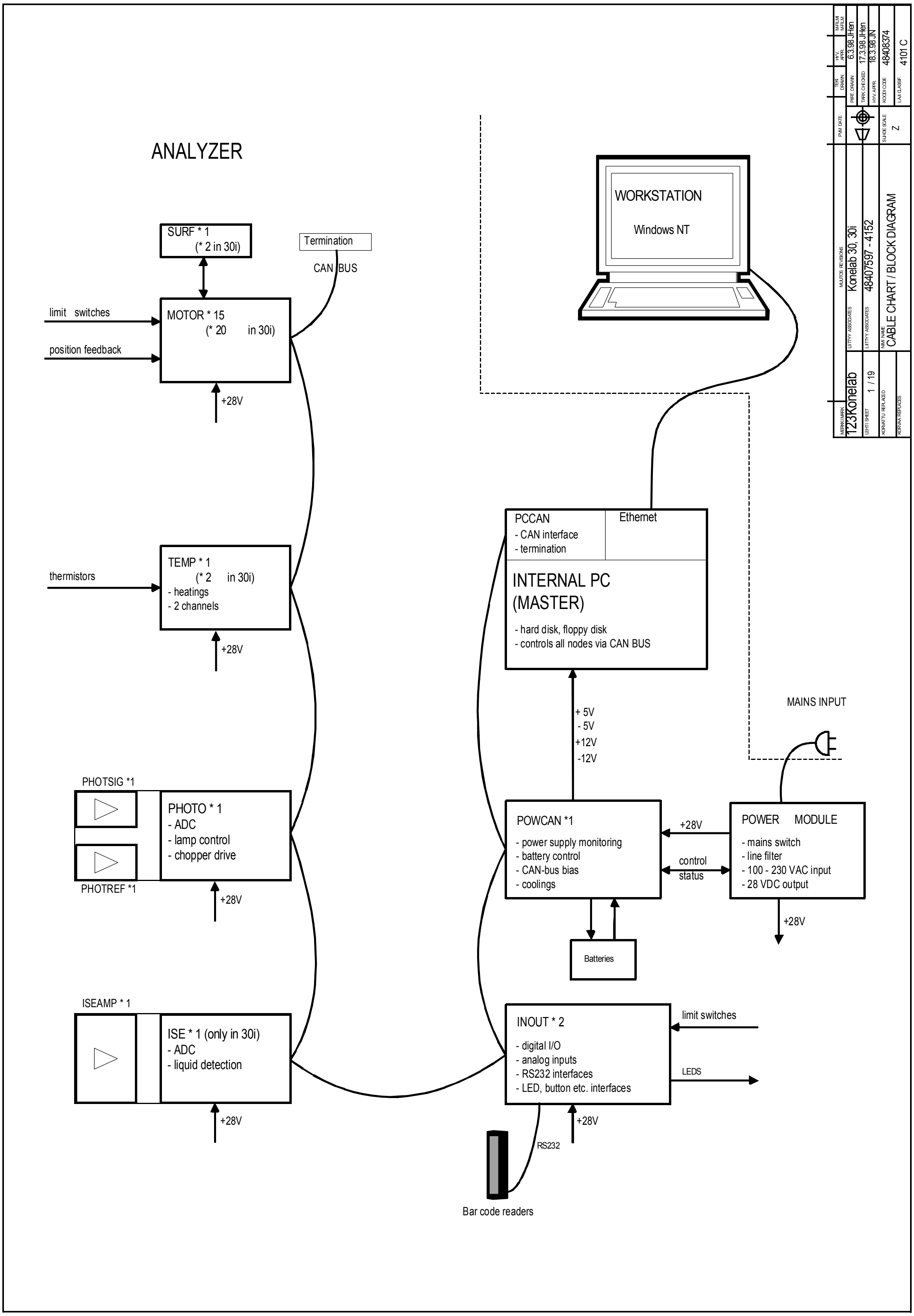


Figure 3-42 Block diagram (30,30i)

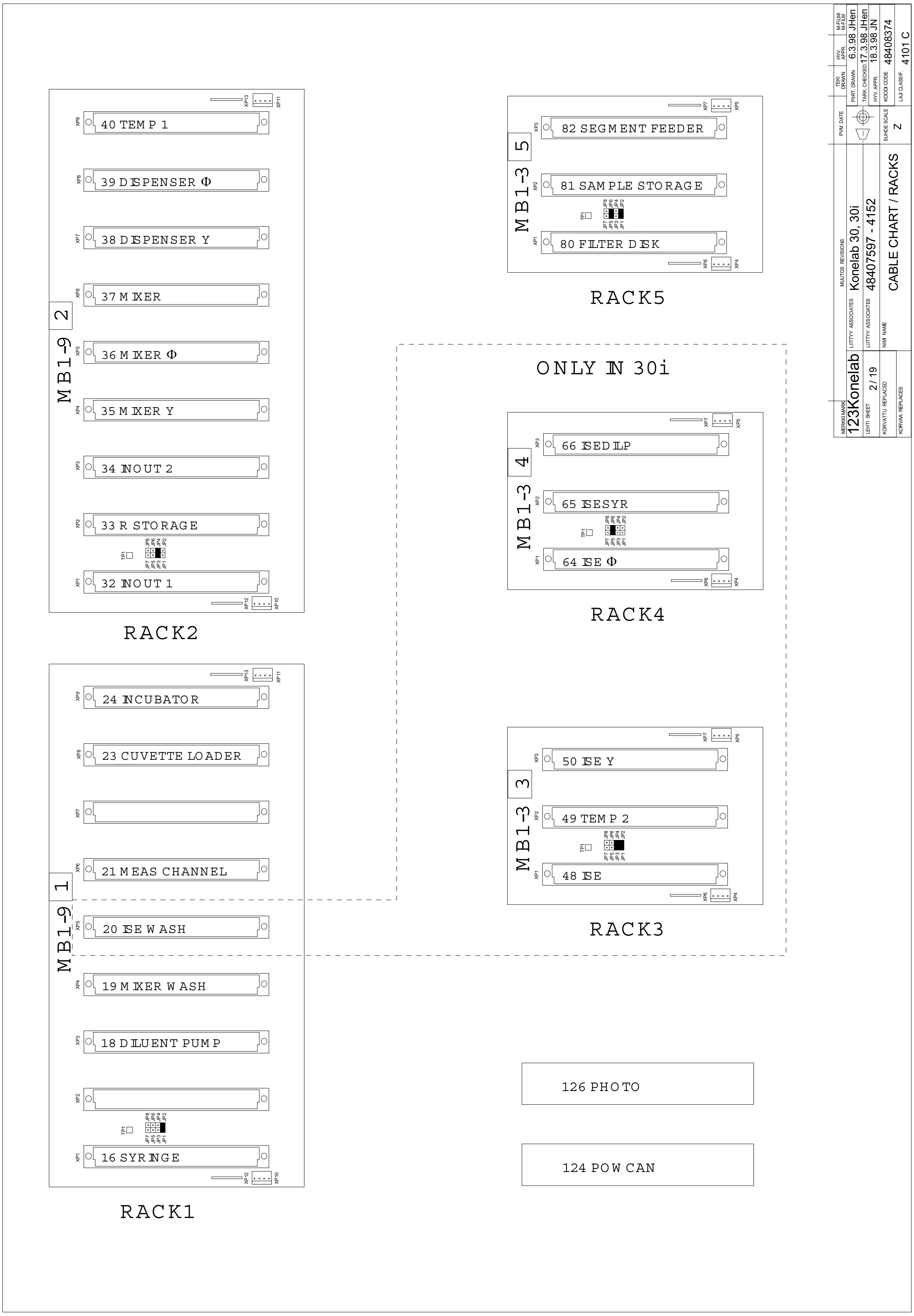


Figure 3-43 Racks (30,30i)

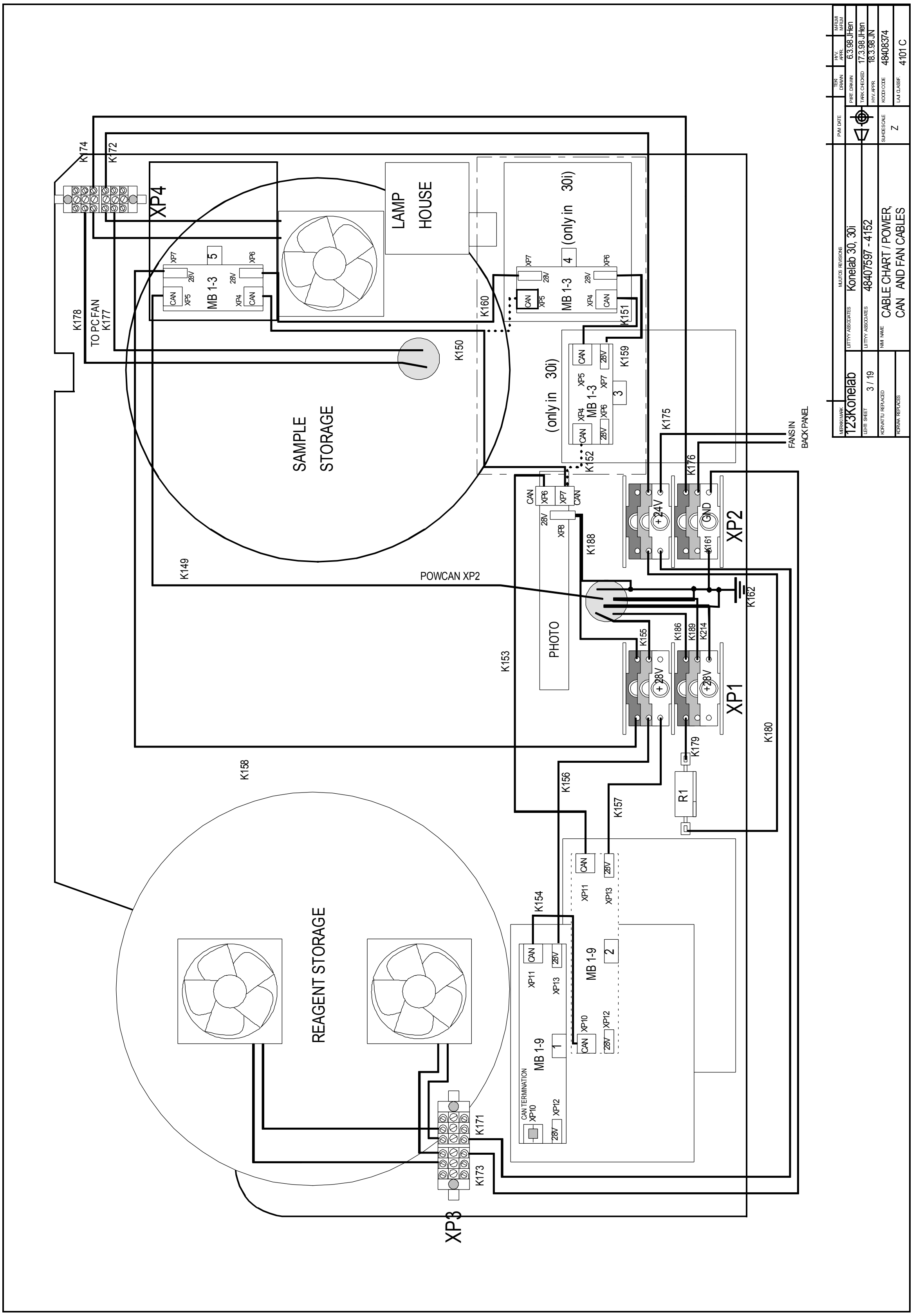


Figure 3-44 Power, can and fan cables (30,30i)

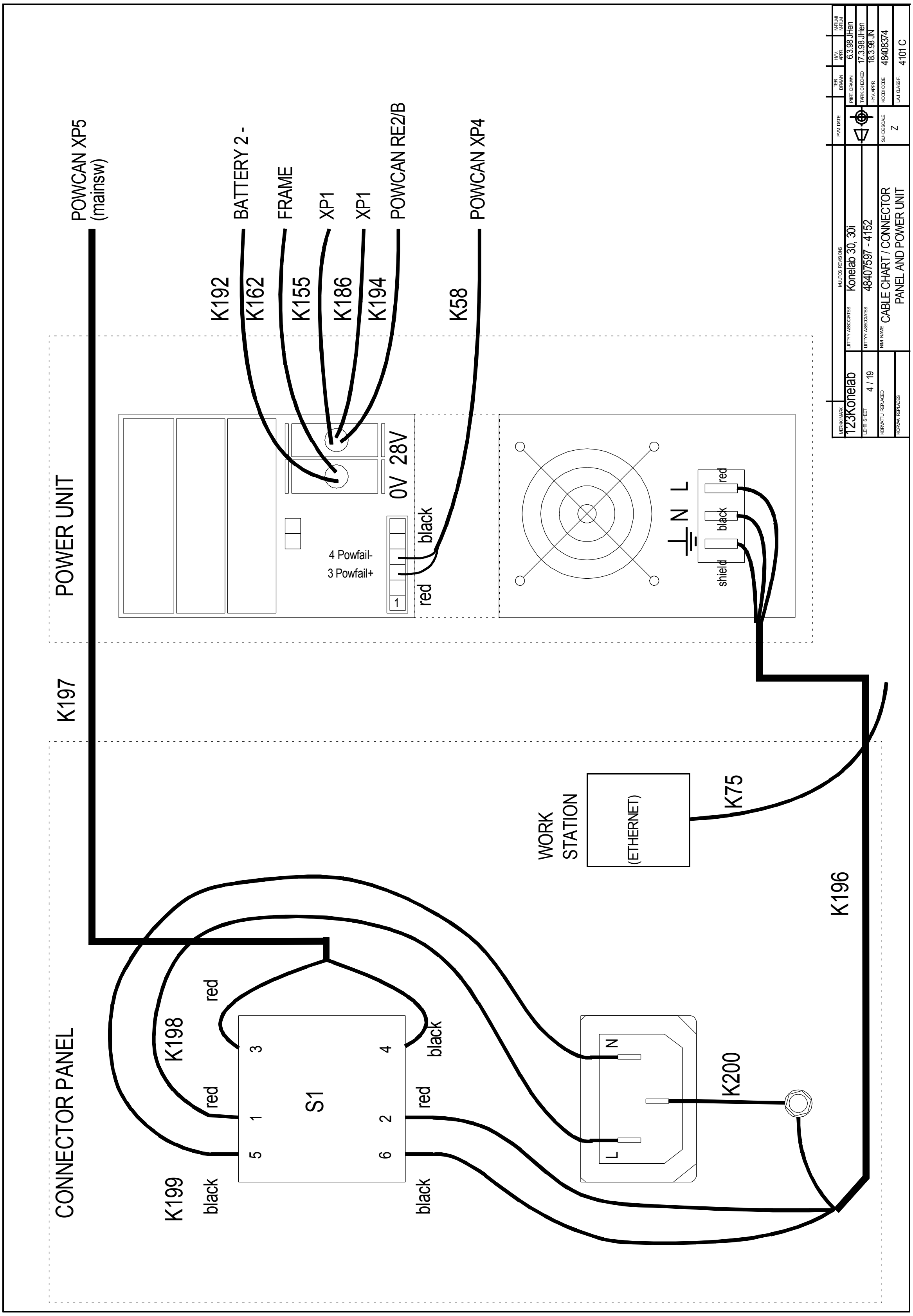


Figure 3-45 Connector panel power unit (30,30i)

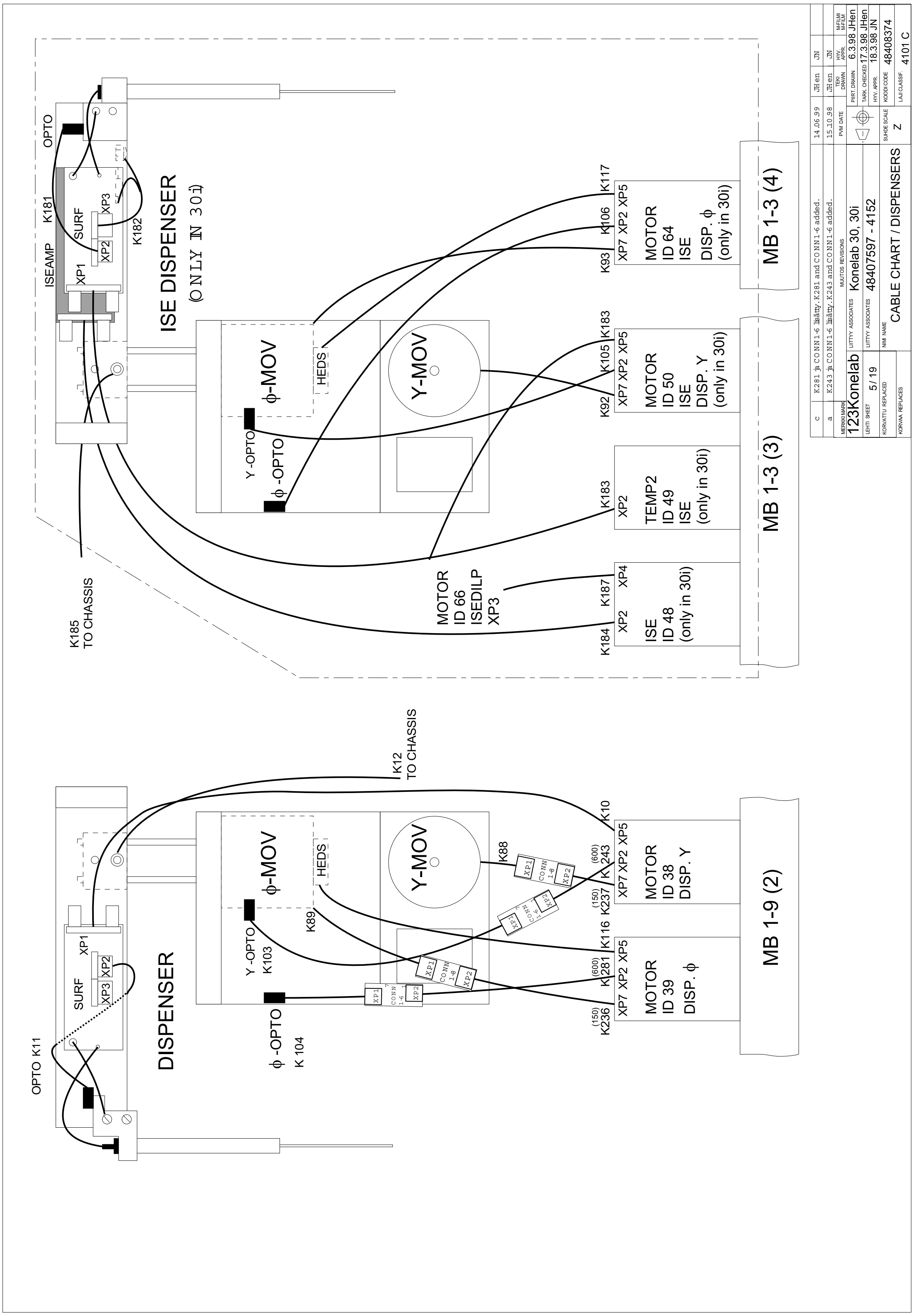


Figure 3-46 Dispensers (30,30i)

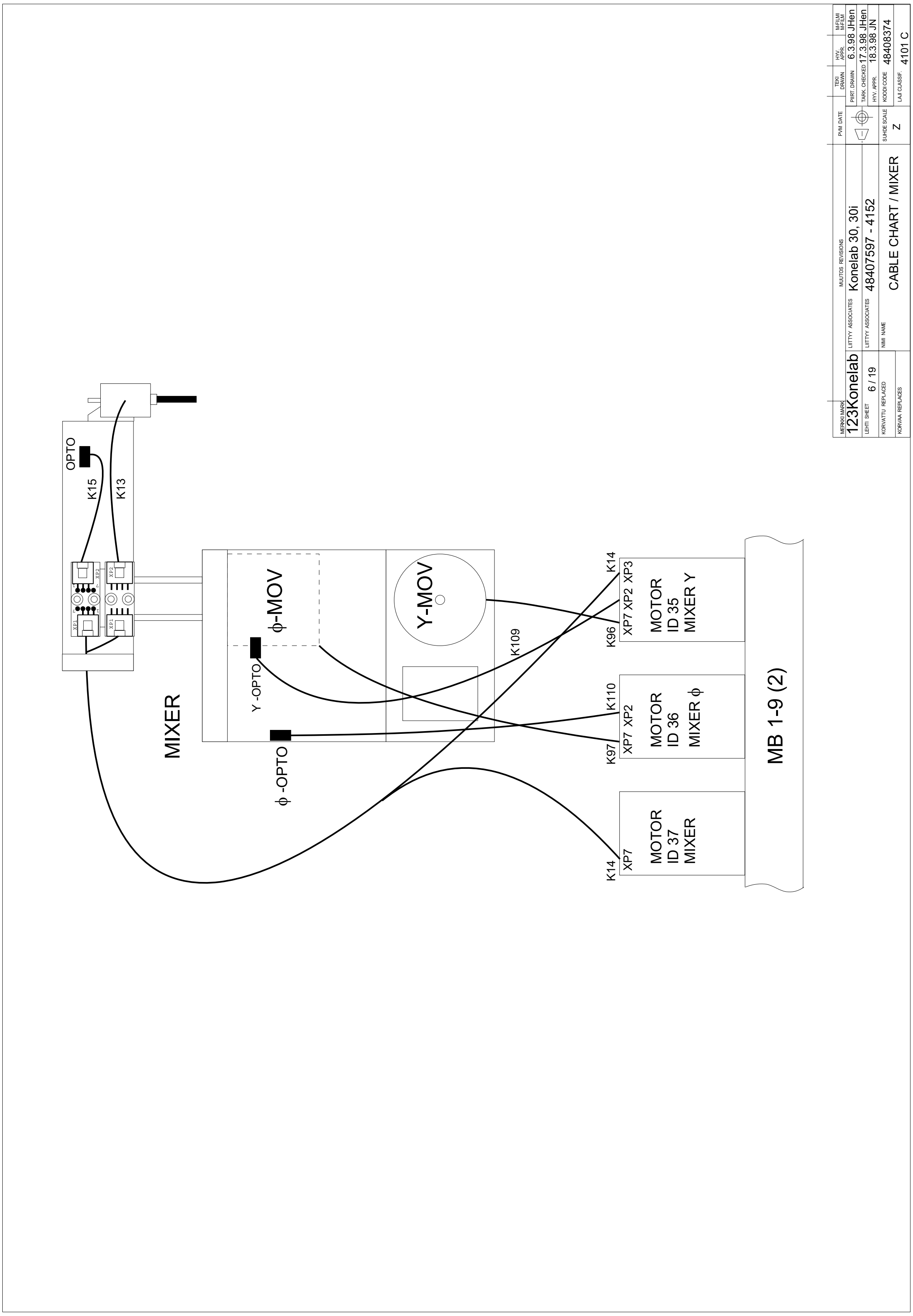


Figure 3-47 Mixer (30,30i)

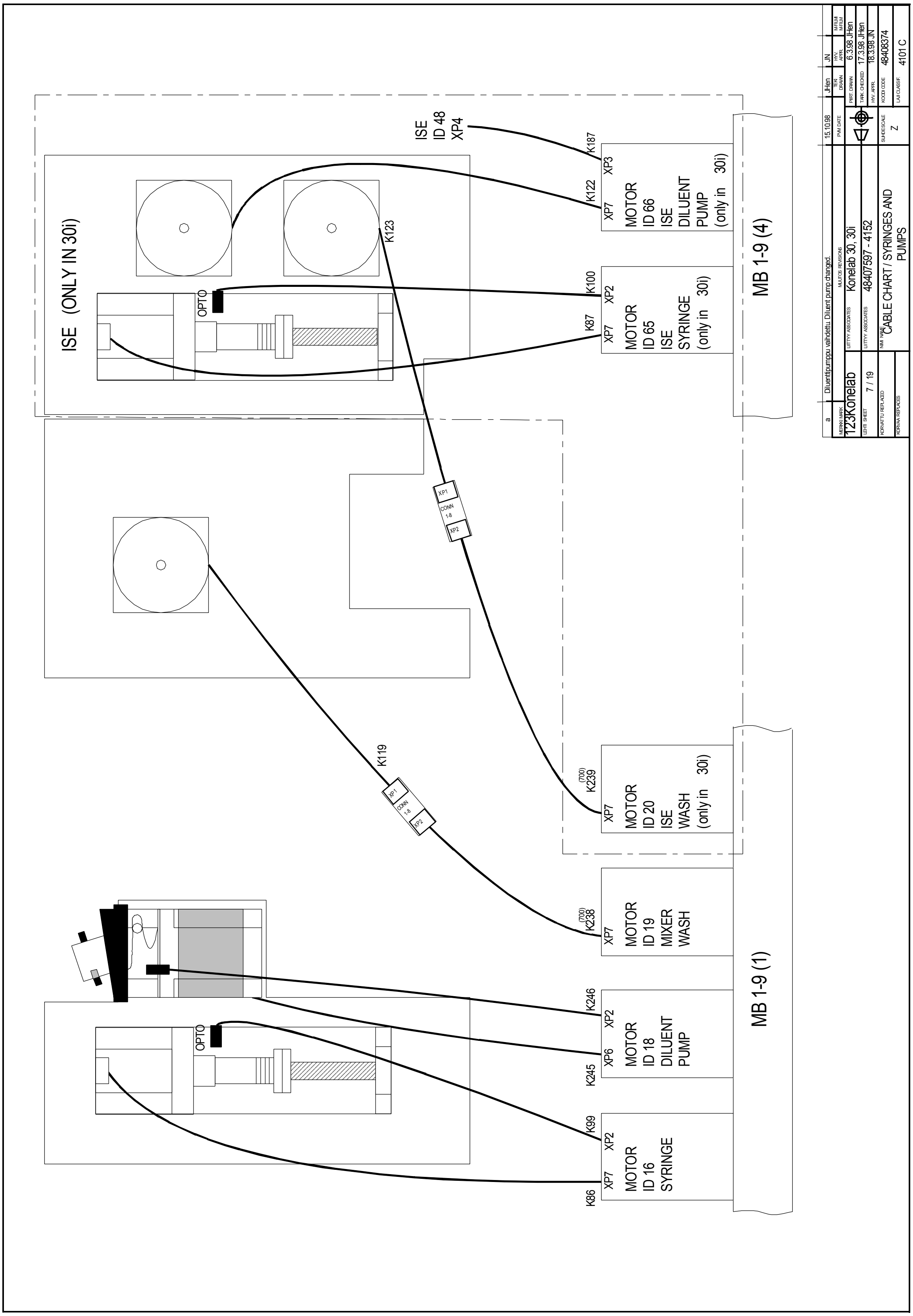


Figure 3-48 Syringes and pumps (30,30i)

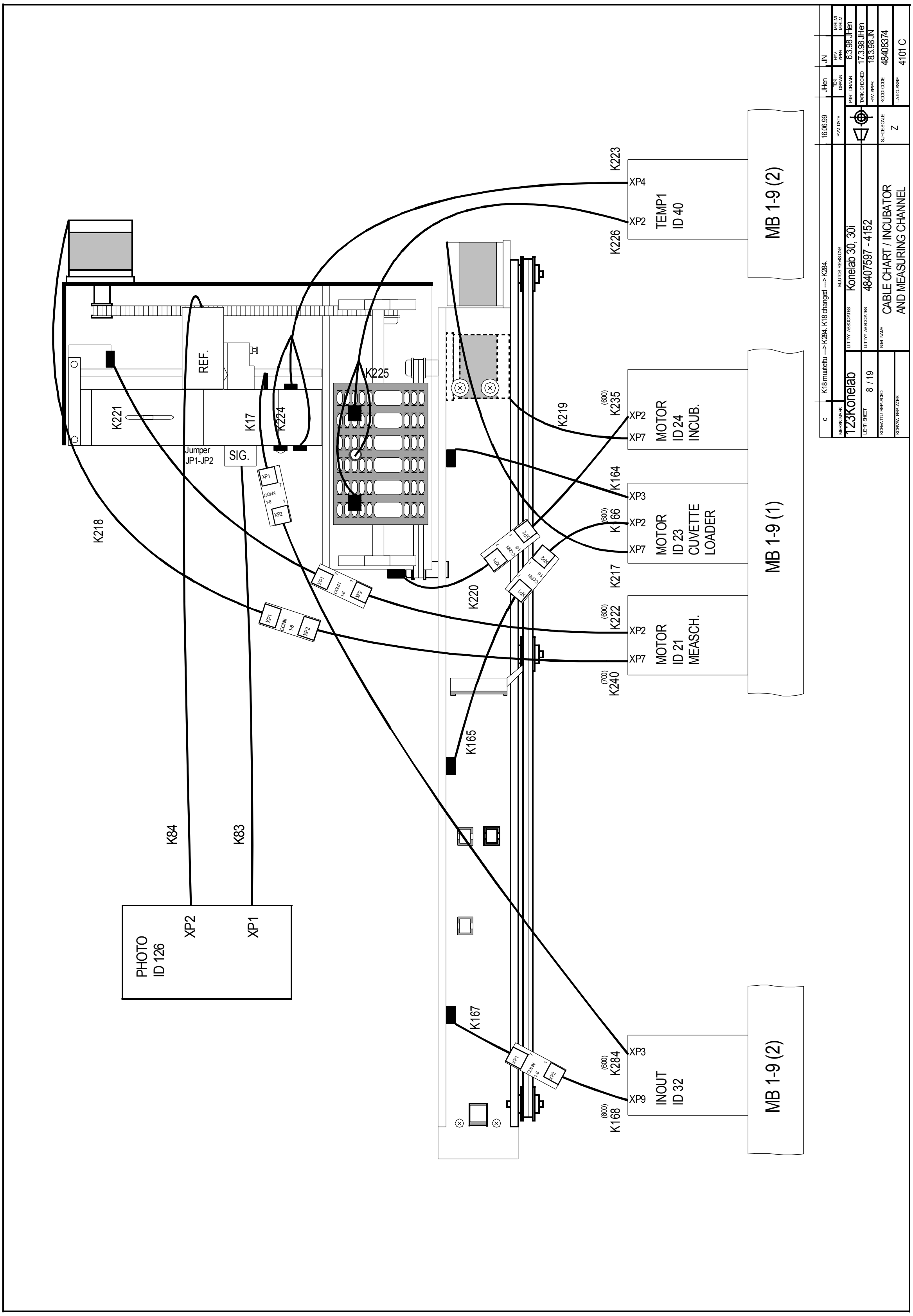


Figure 3-49 Incubator and measuring channel (30,30i)

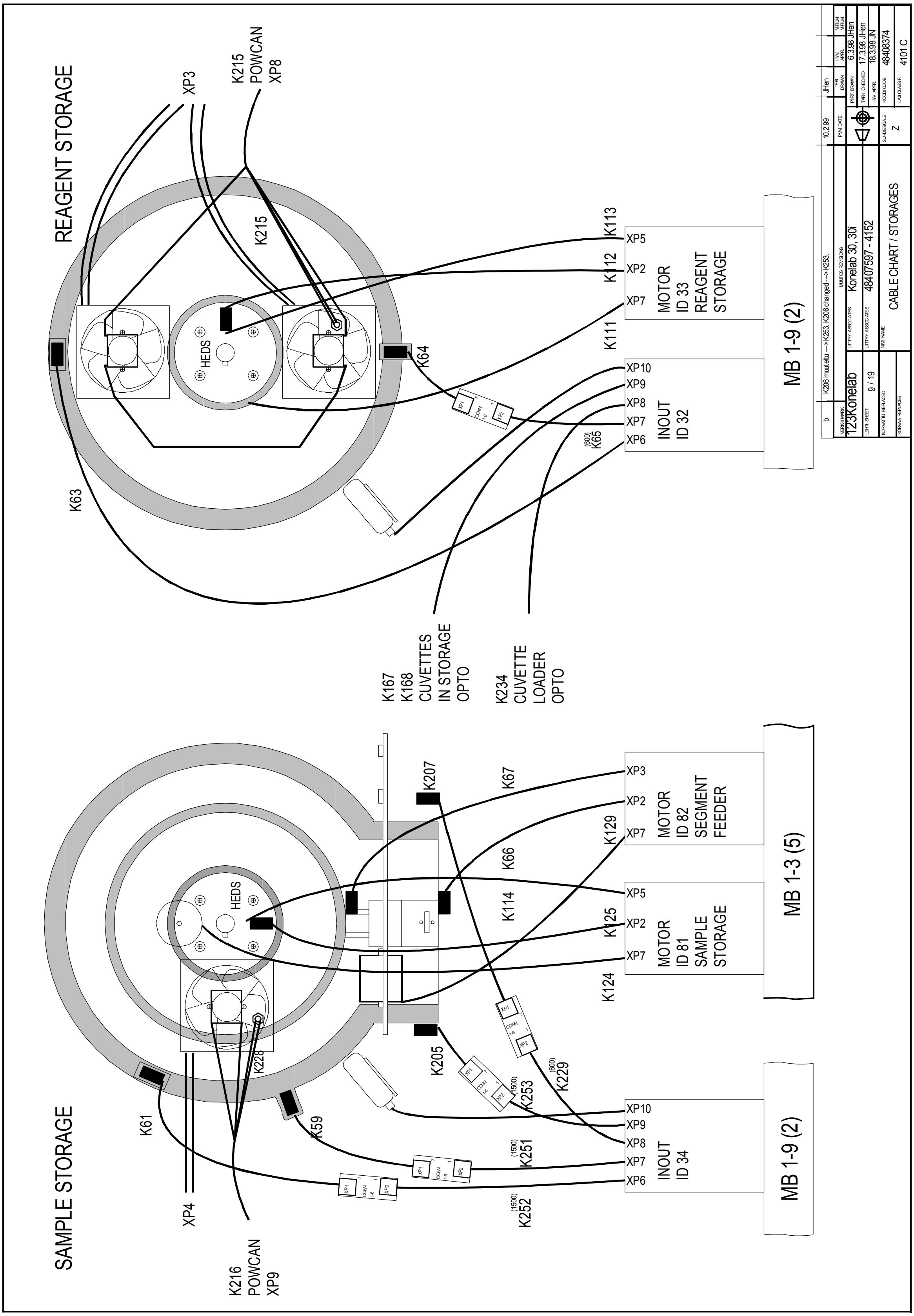


Figure 3-50 Storages (30,30i)

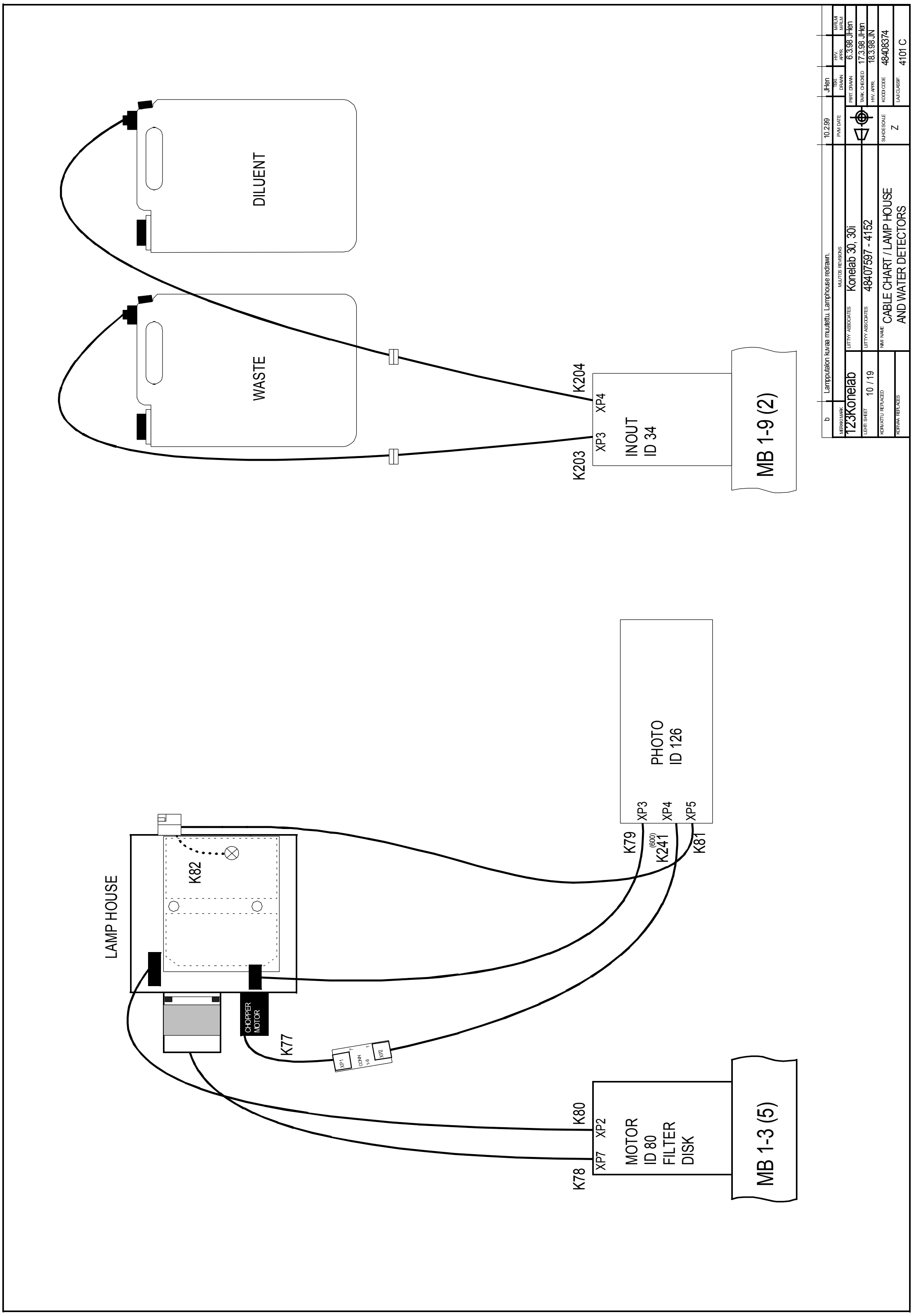


Figure 3-51 Lamp house and water detectors (30,30i)

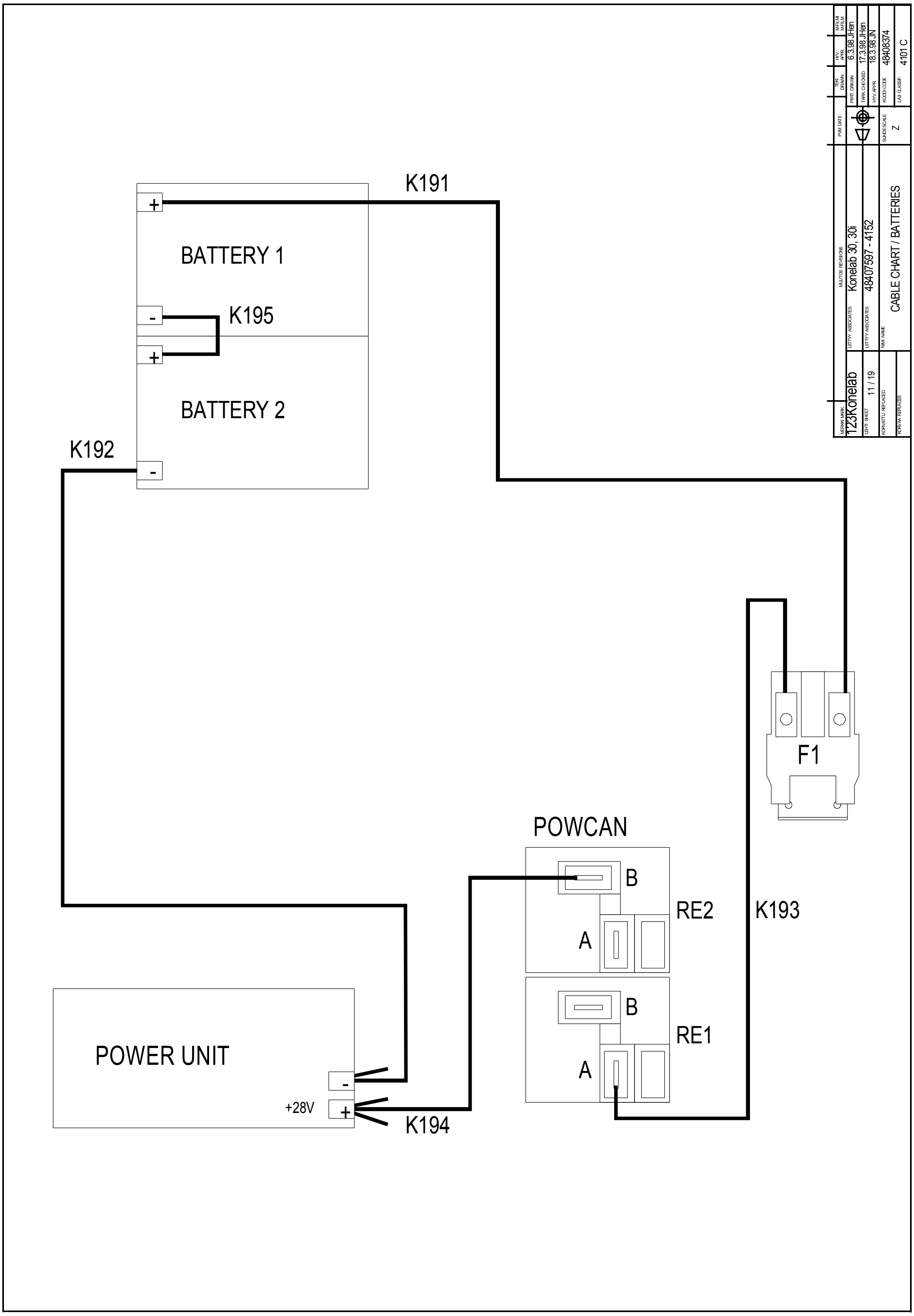


Figure 3-52 Batteries (30,30i)

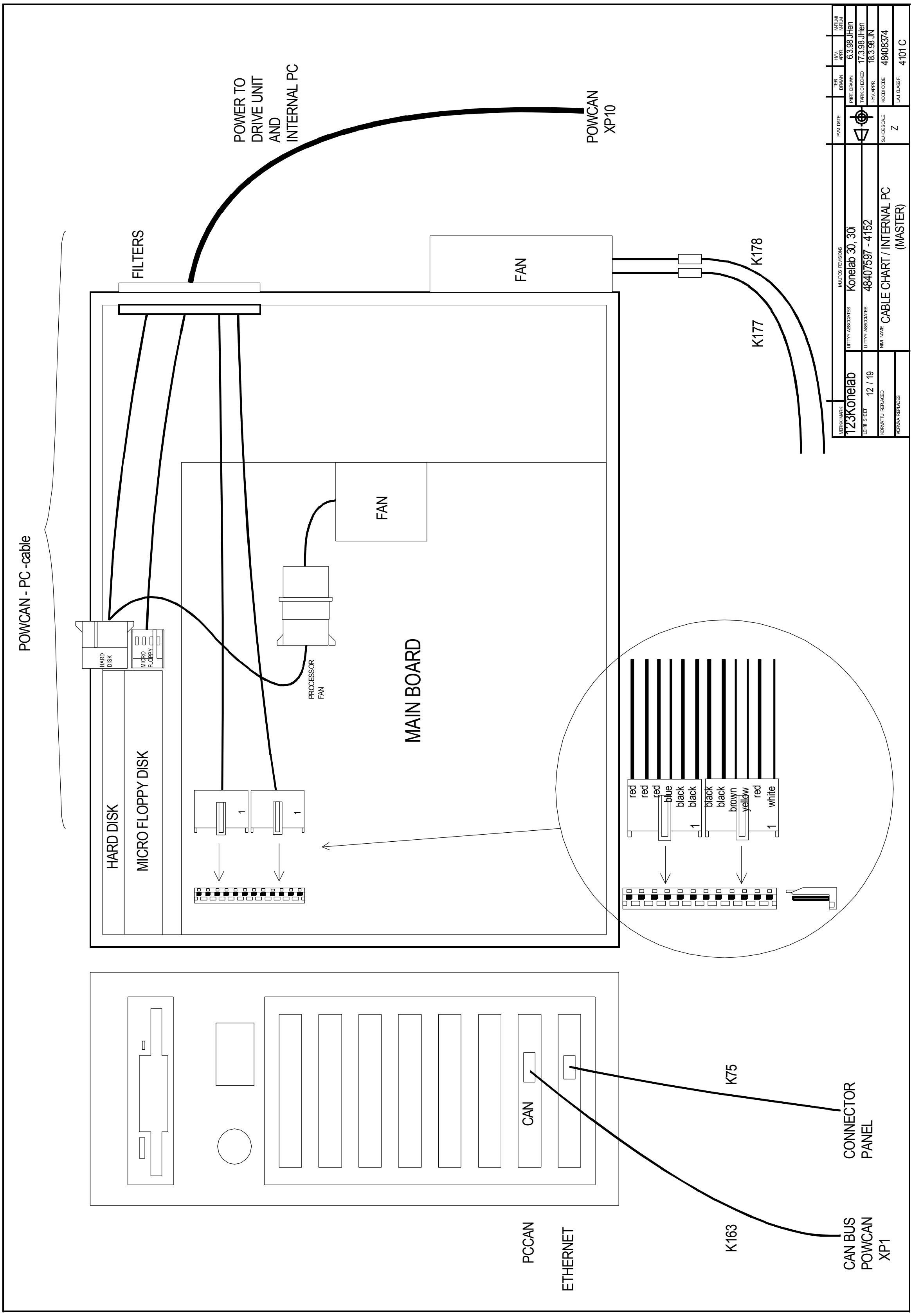


Figure 3-53 Internal PC (master) (30,30i)

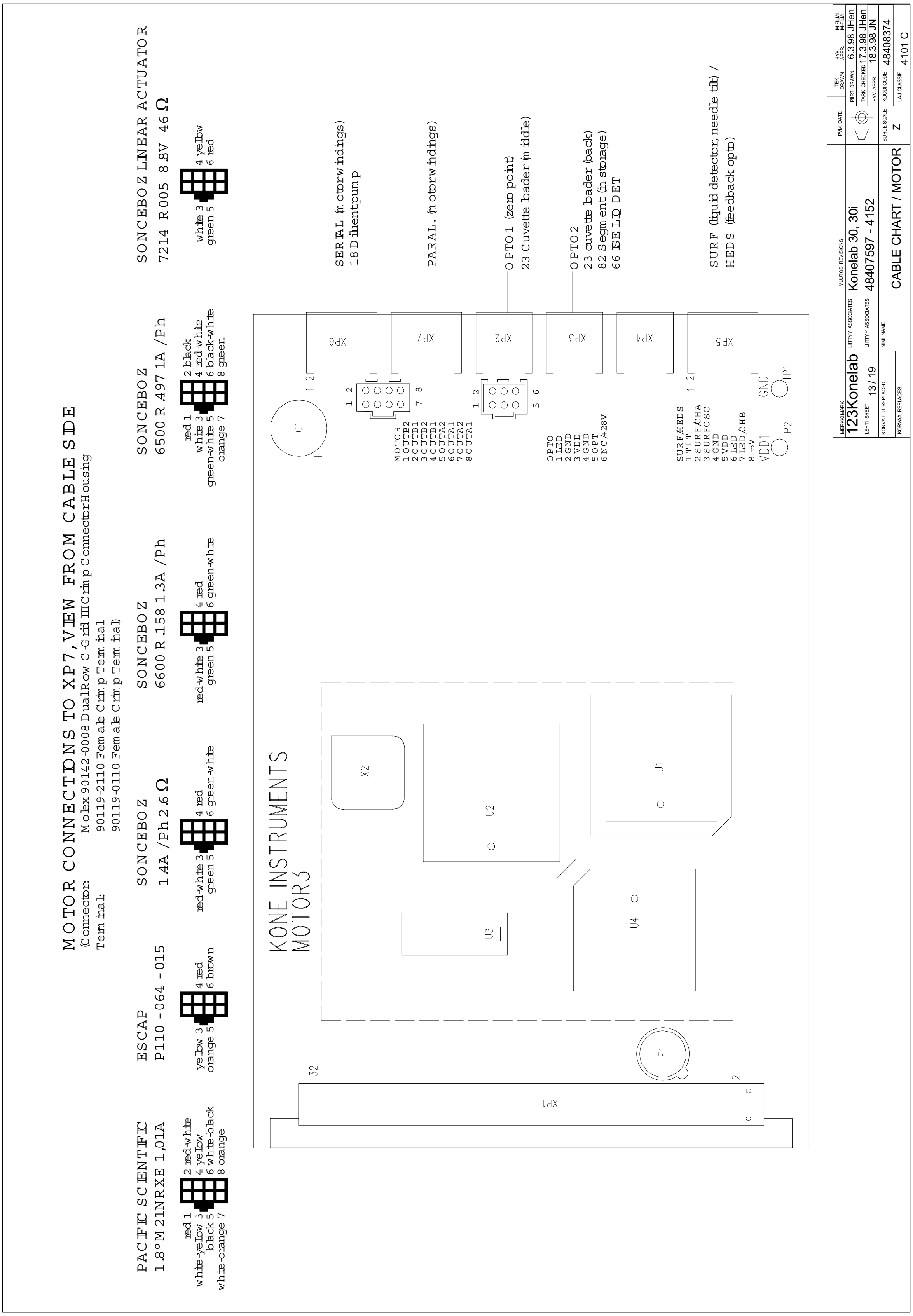


Figure 3-54 Motor (30,30i)

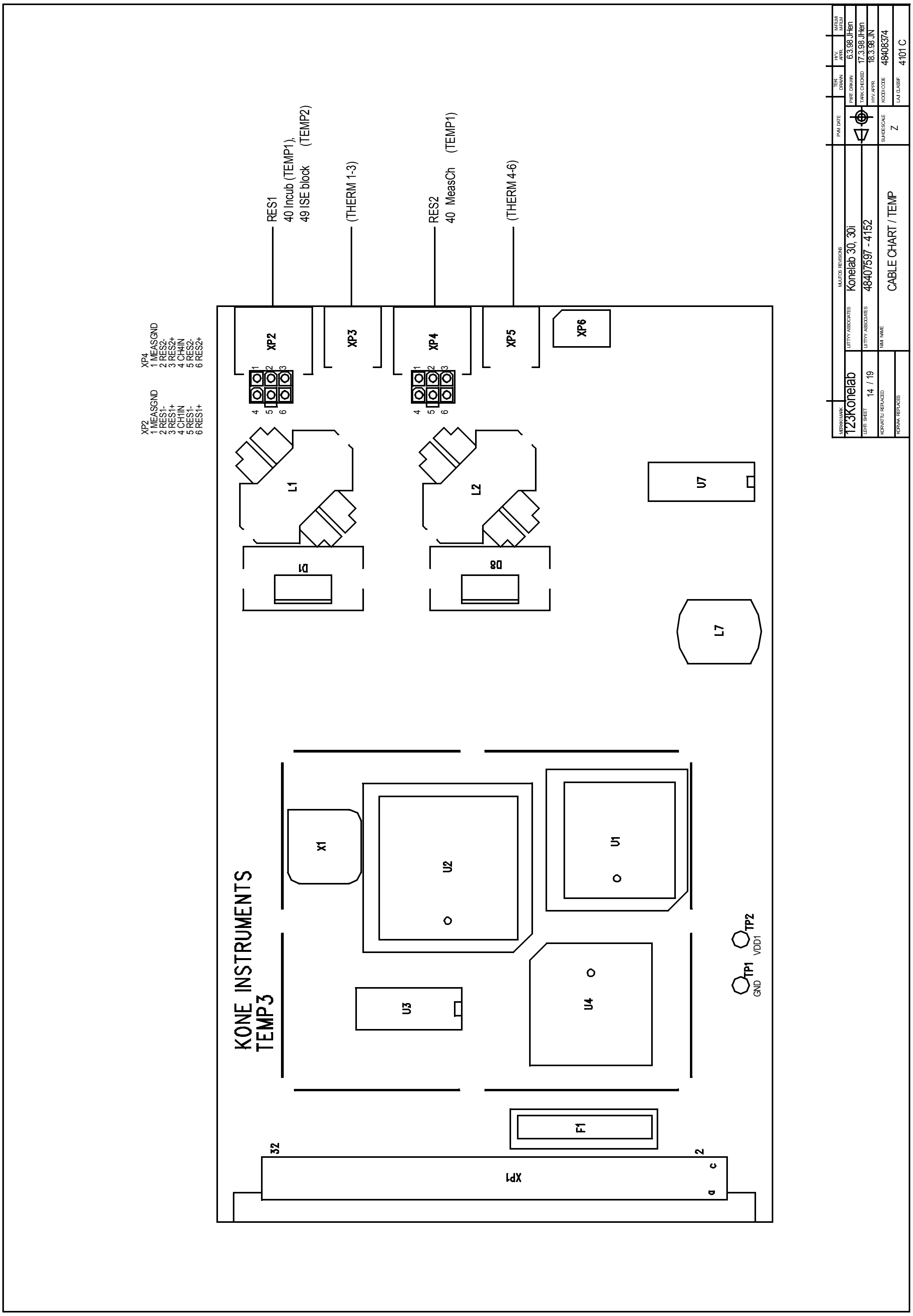


Figure 3-55 Temp (30,30i)

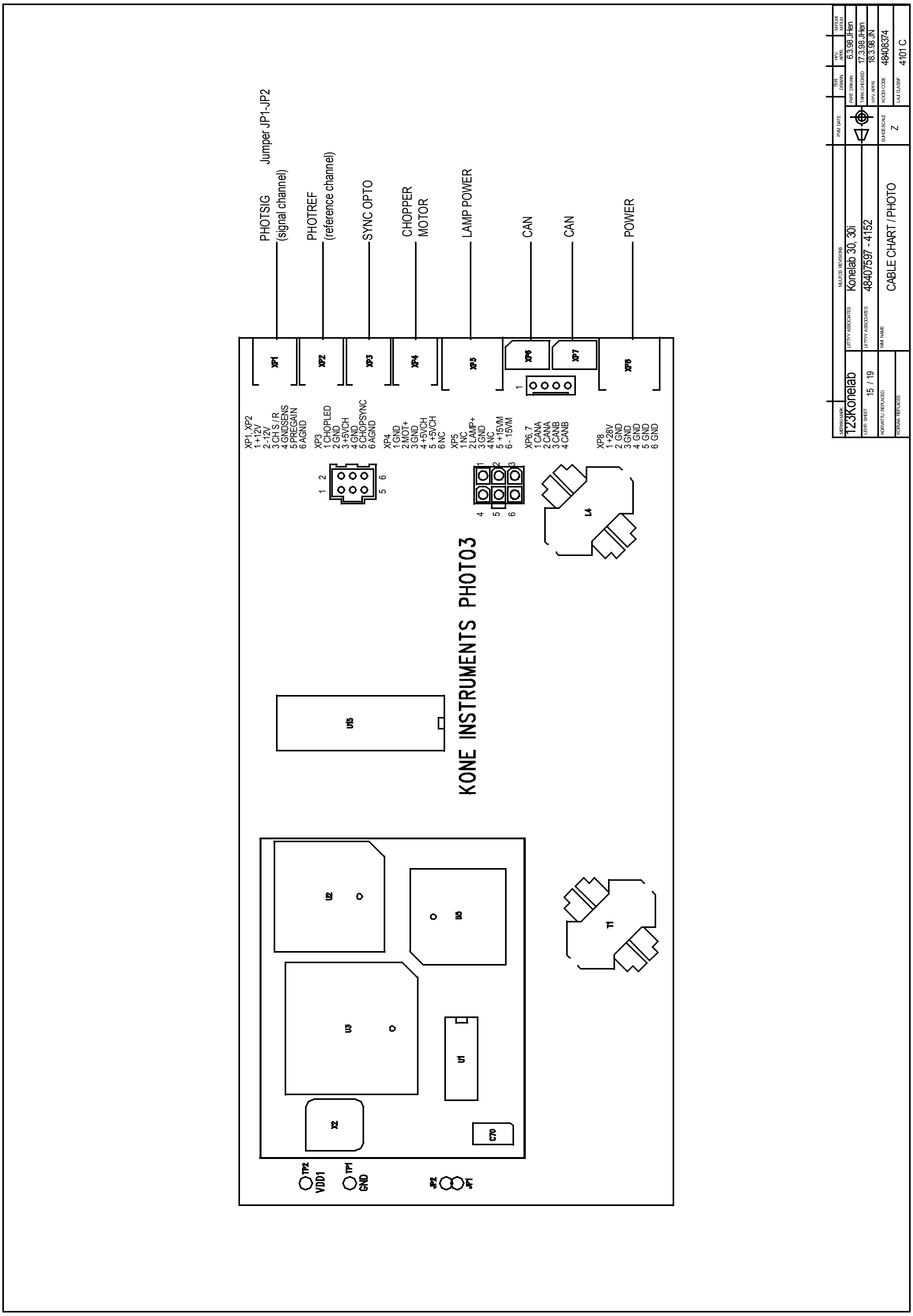


Figure 3-56 Photo (30,30i)

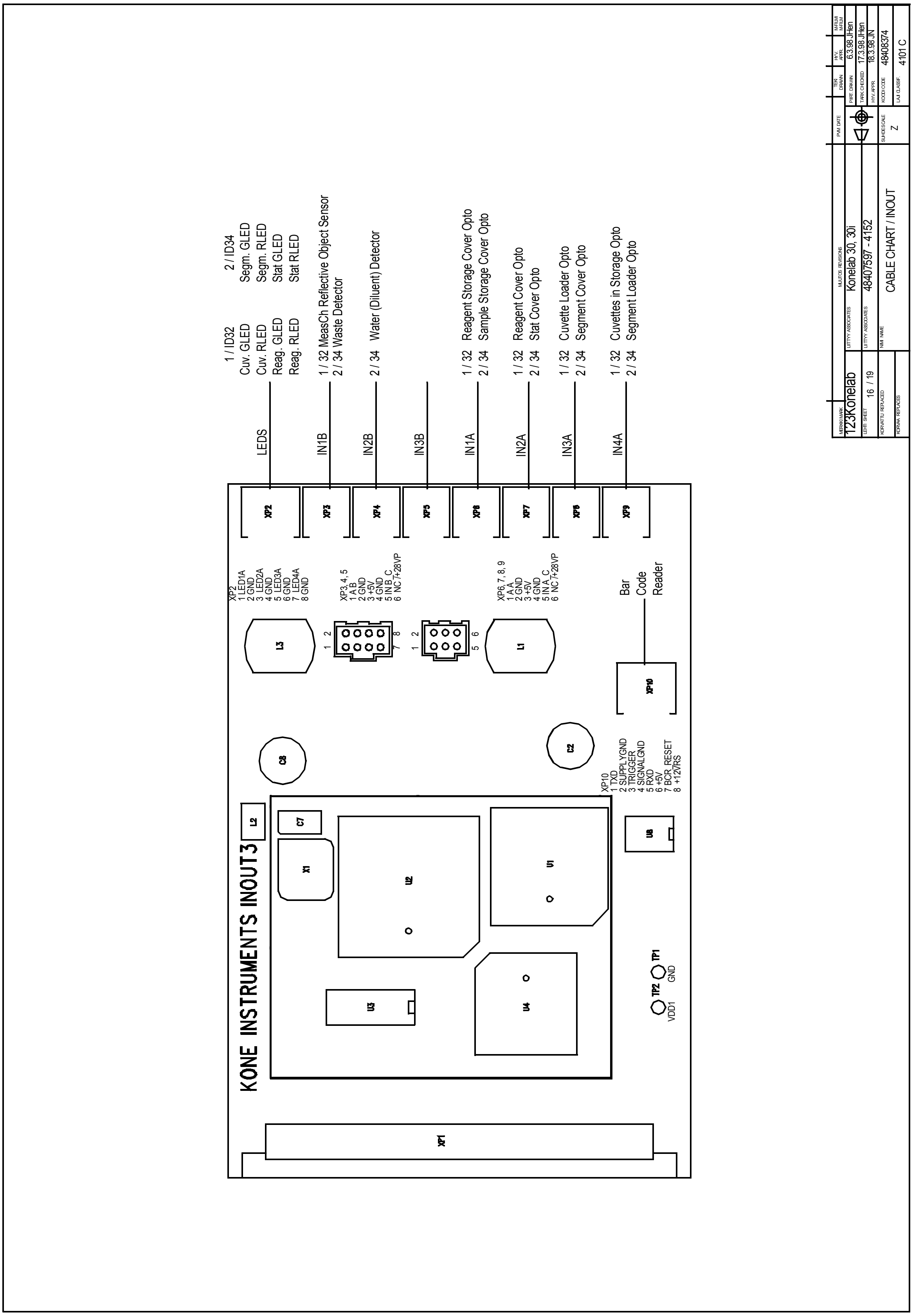


Figure 3-57 INOUT (30,30i)

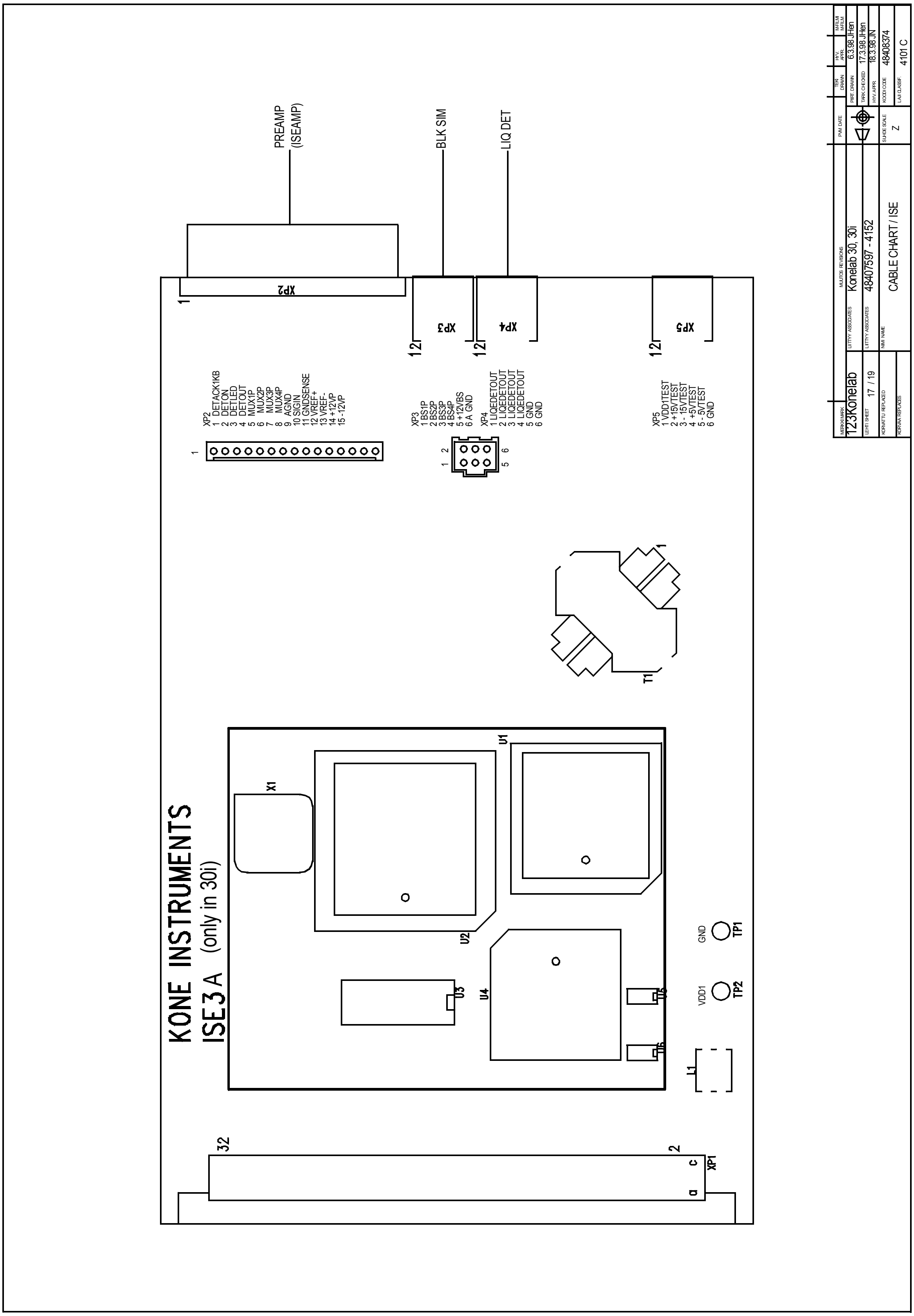
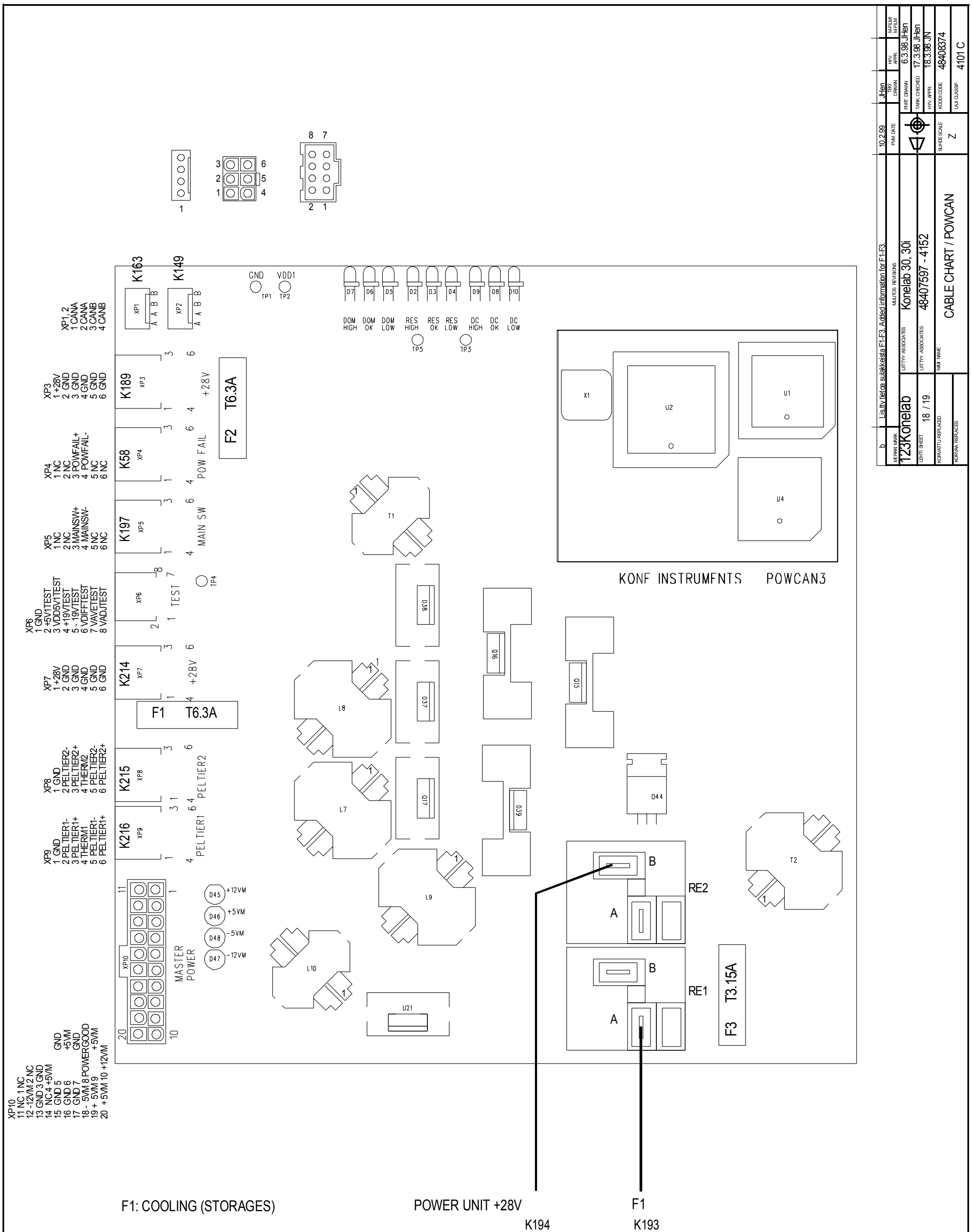


Figure 3-58 ISE



F1: COOLING (STORAGES)

F2: POWCAN, CAN BUS,
INTERNAL PC POWER

F3: CHARGING (BATTERIES)

Figure 3-59 Powcan (30,30i)

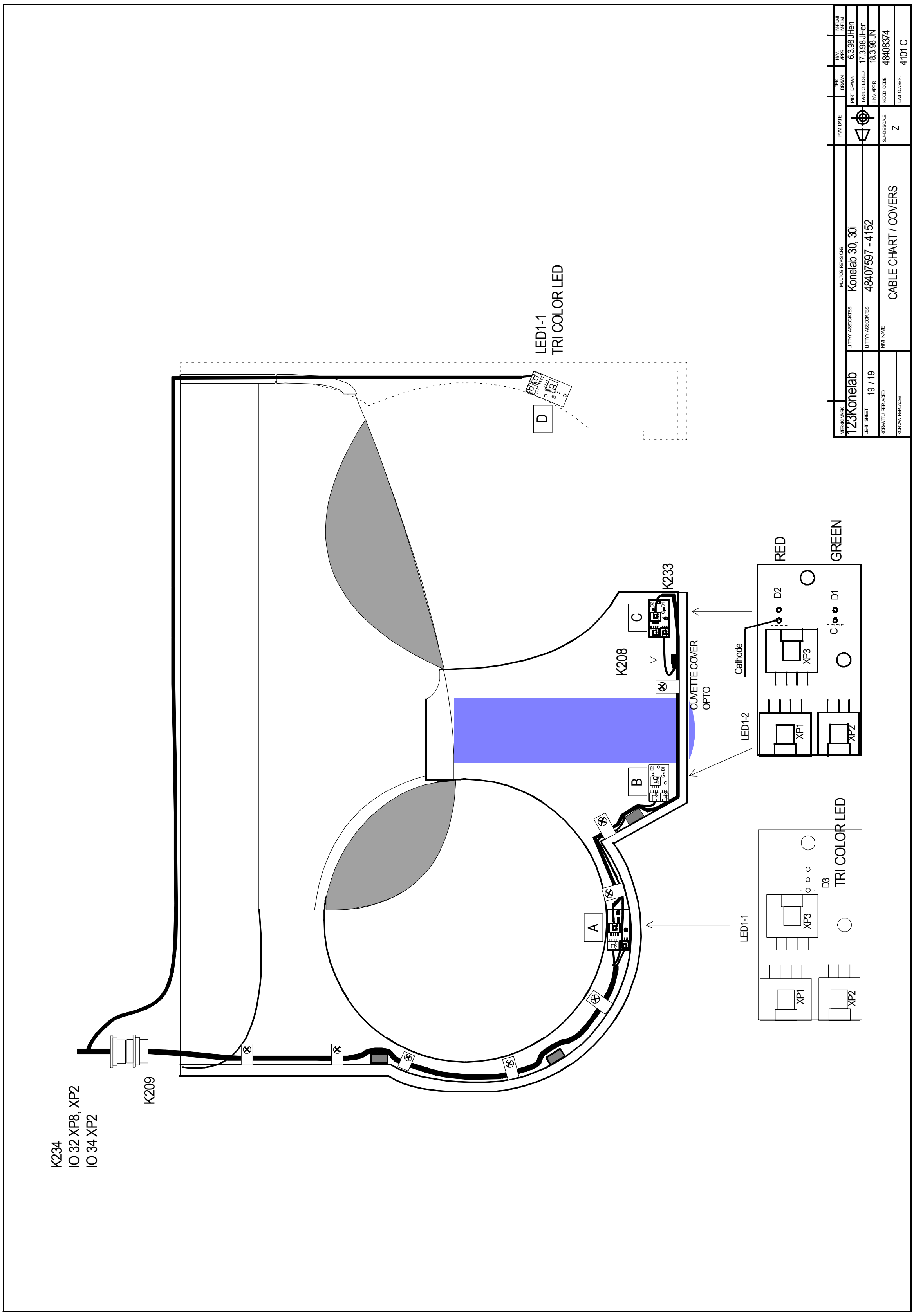


Figure 3-60 Covers (30,30i)

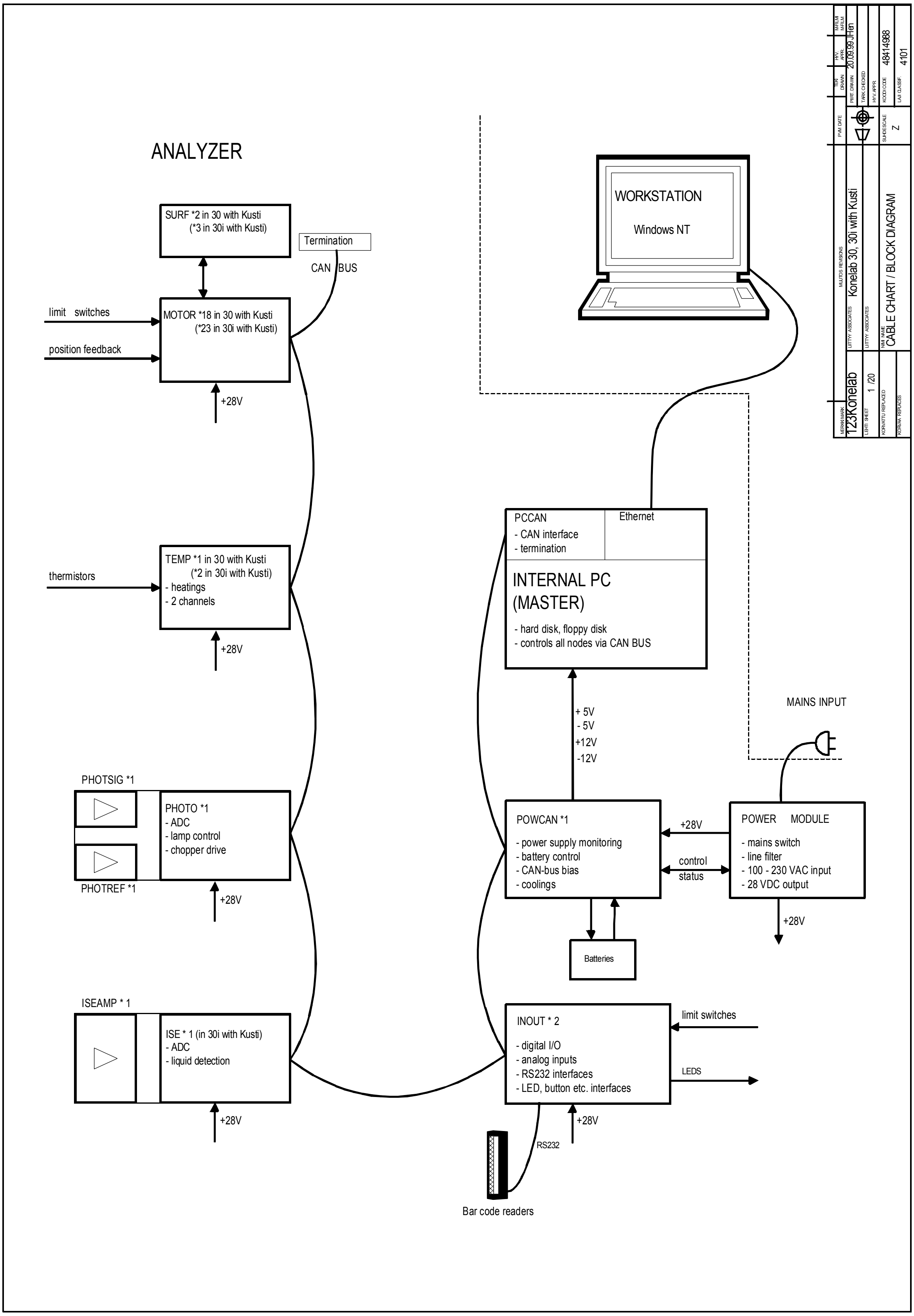


Figure 3-61 Block diagram (30, 30i Kusti)

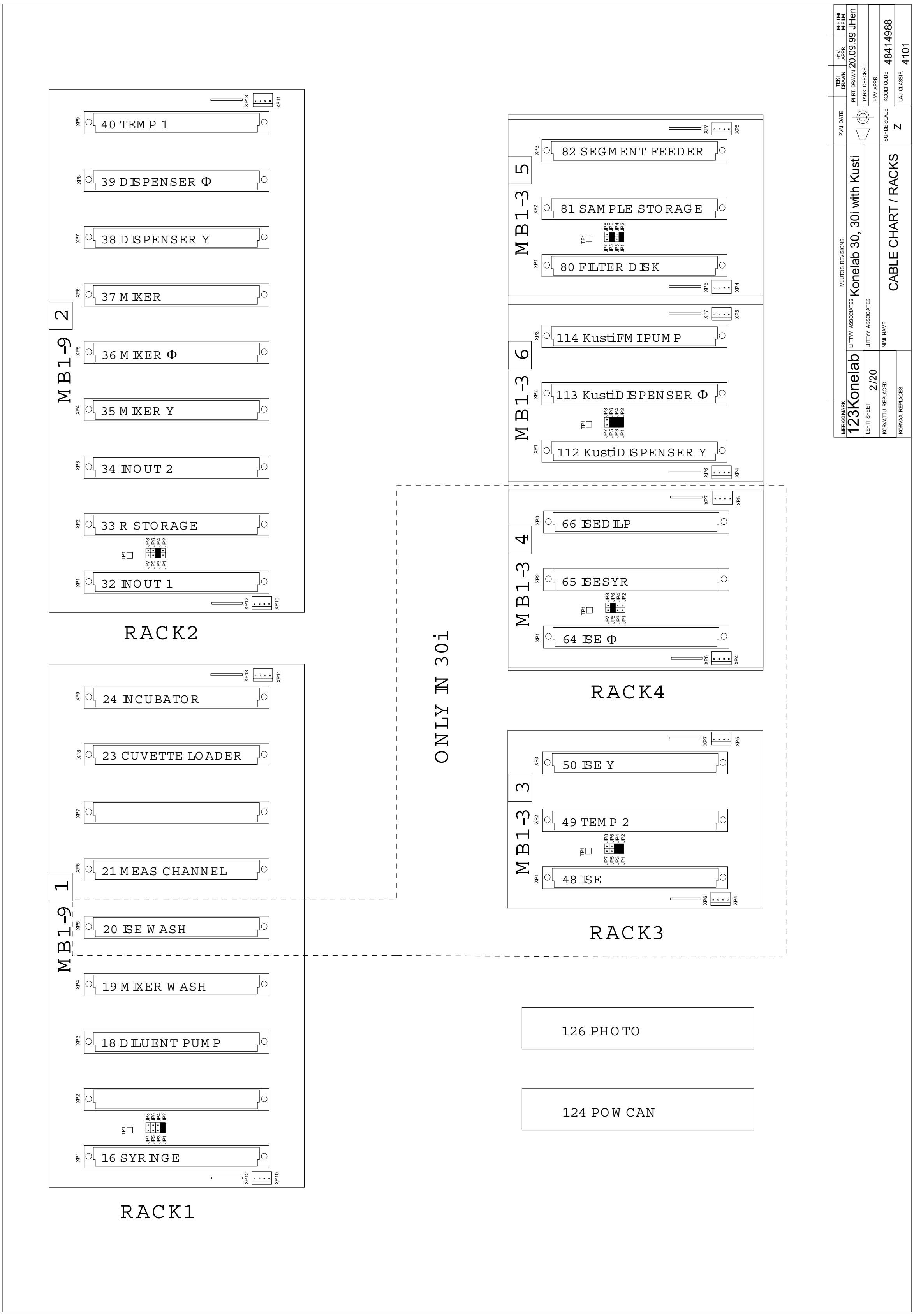


Figure 3-62 Racks (30, 30i Kusti)

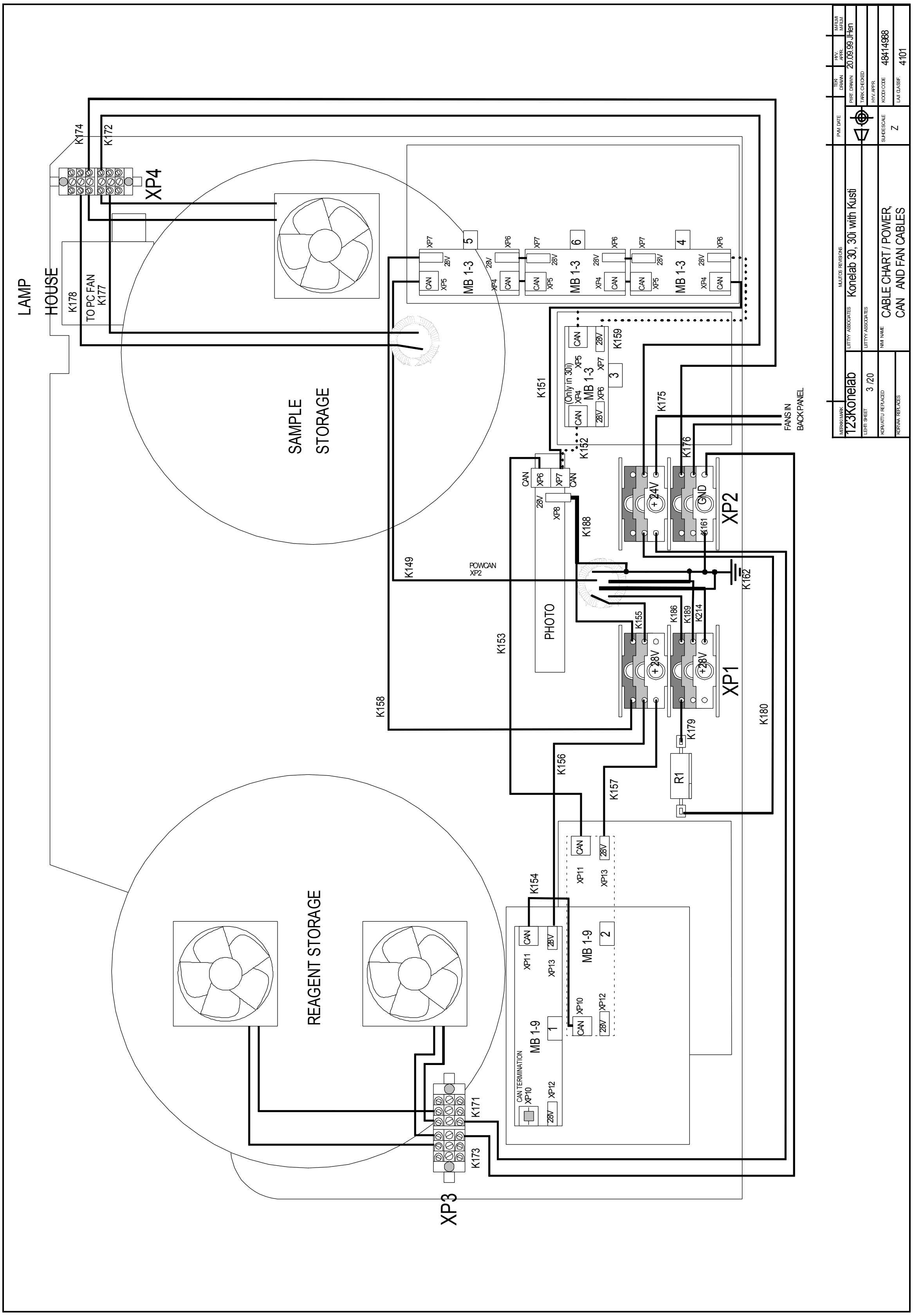


Figure 3-63 Power, can and fan cables (30, 30i Kusti)

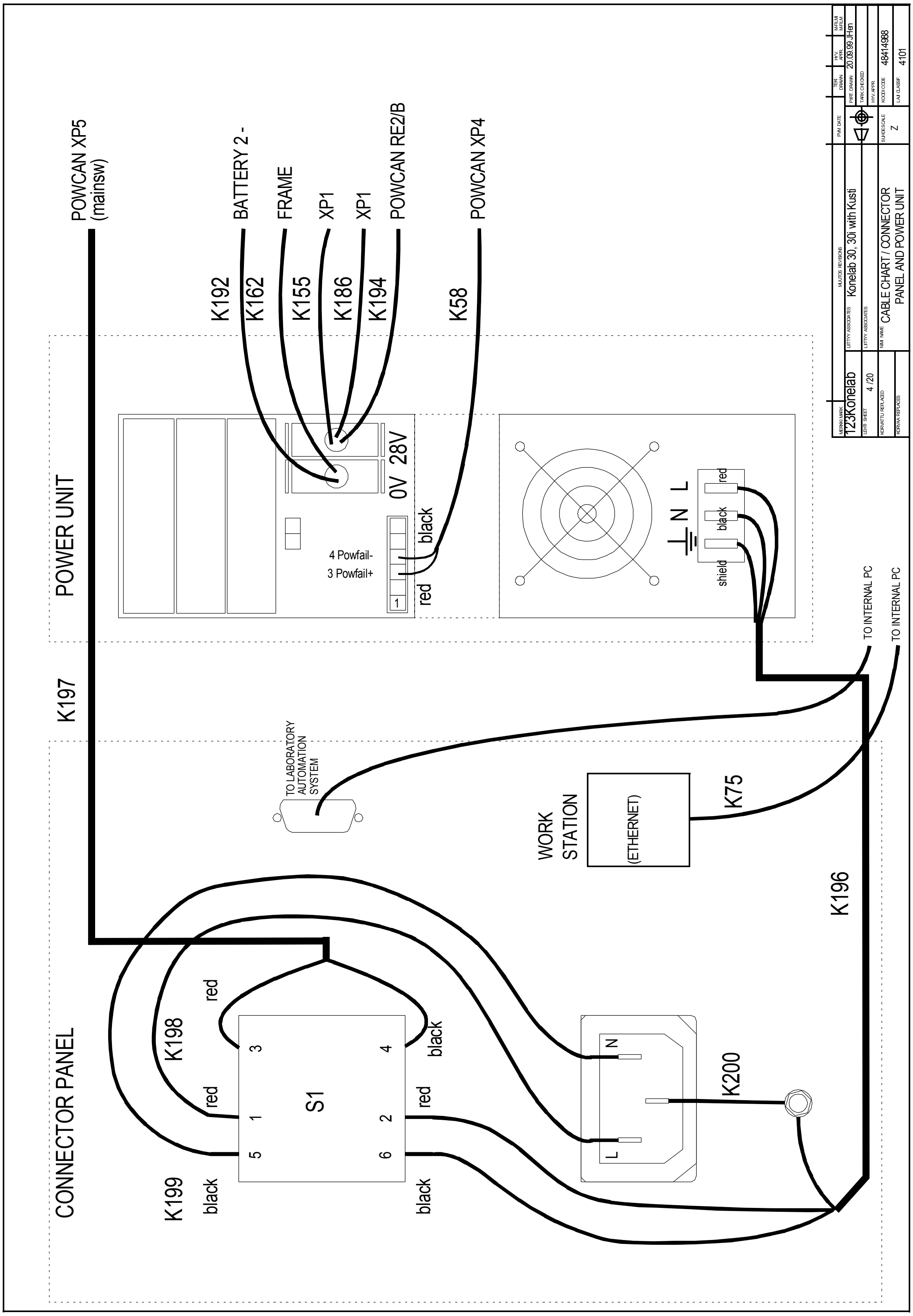


Figure 3-64 Connector panel and power unit (30, 30i Kusti)

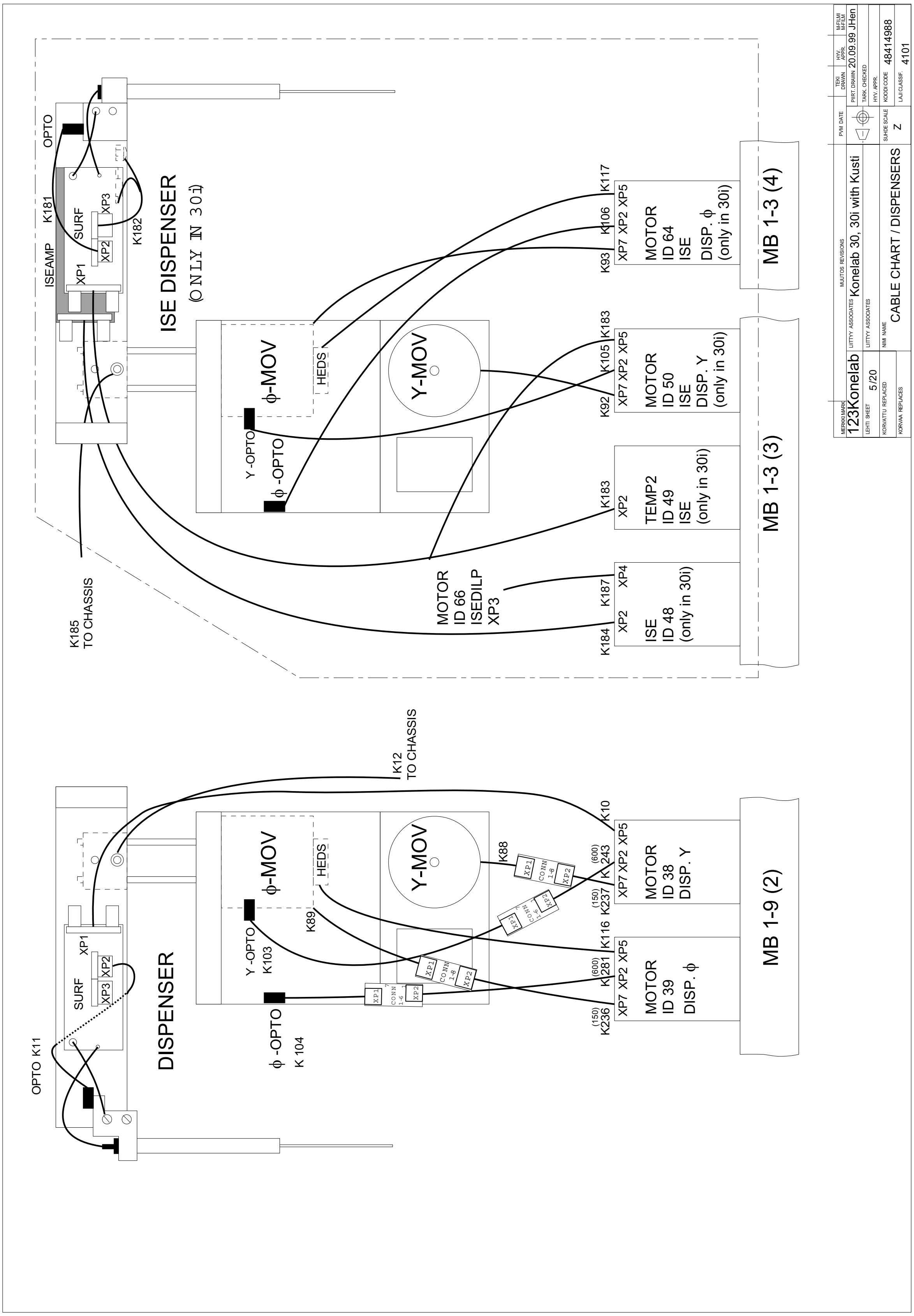


Figure 3-65 Dispensers (30, 30i Kusti)

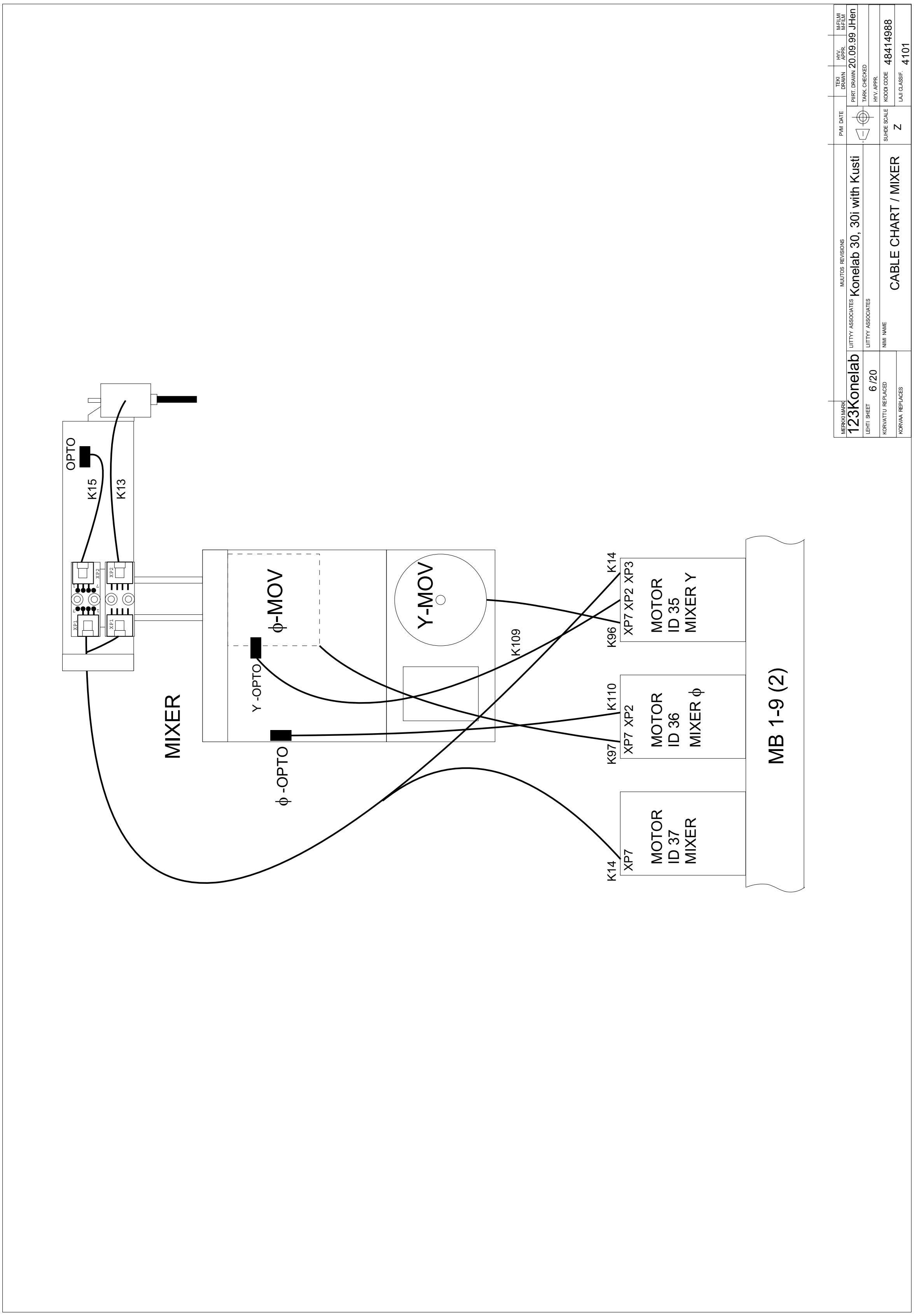


Figure 3-66 Mixer (30, 30i Kusti)

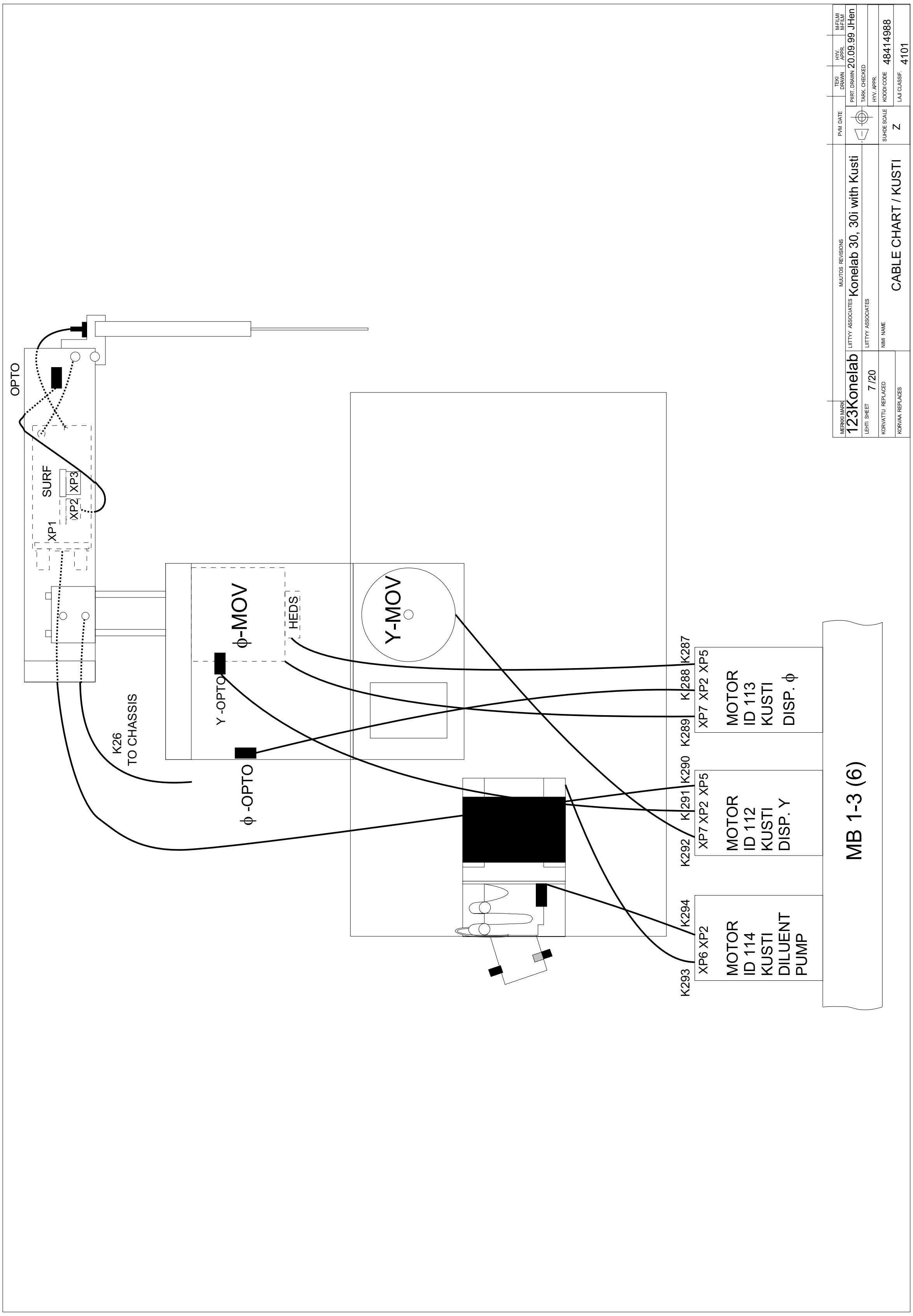


Figure 3-67 Kusti (30, 30i Kusti)

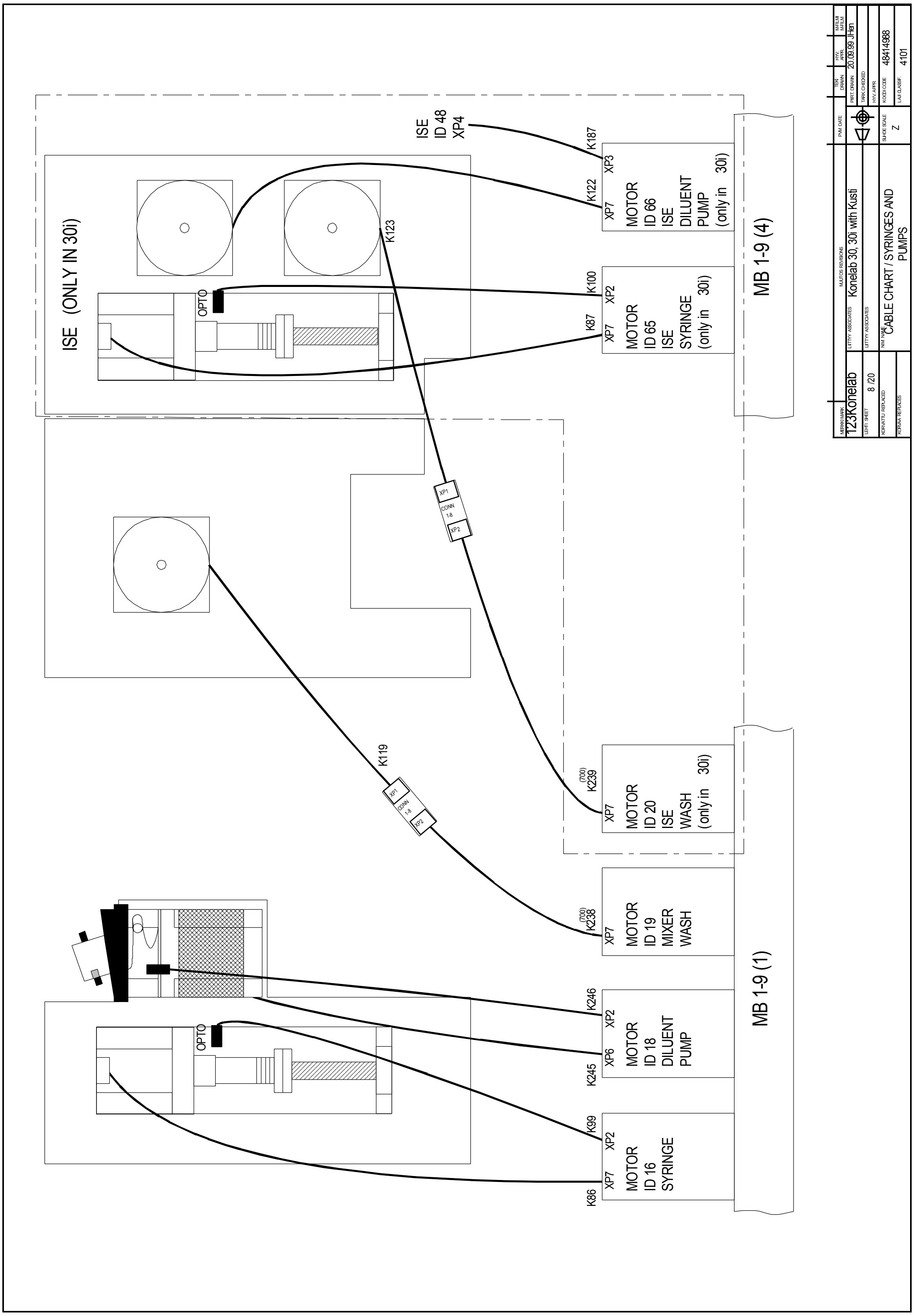


Figure 3-68 Syringes and pumps (30, 30i Kusti)

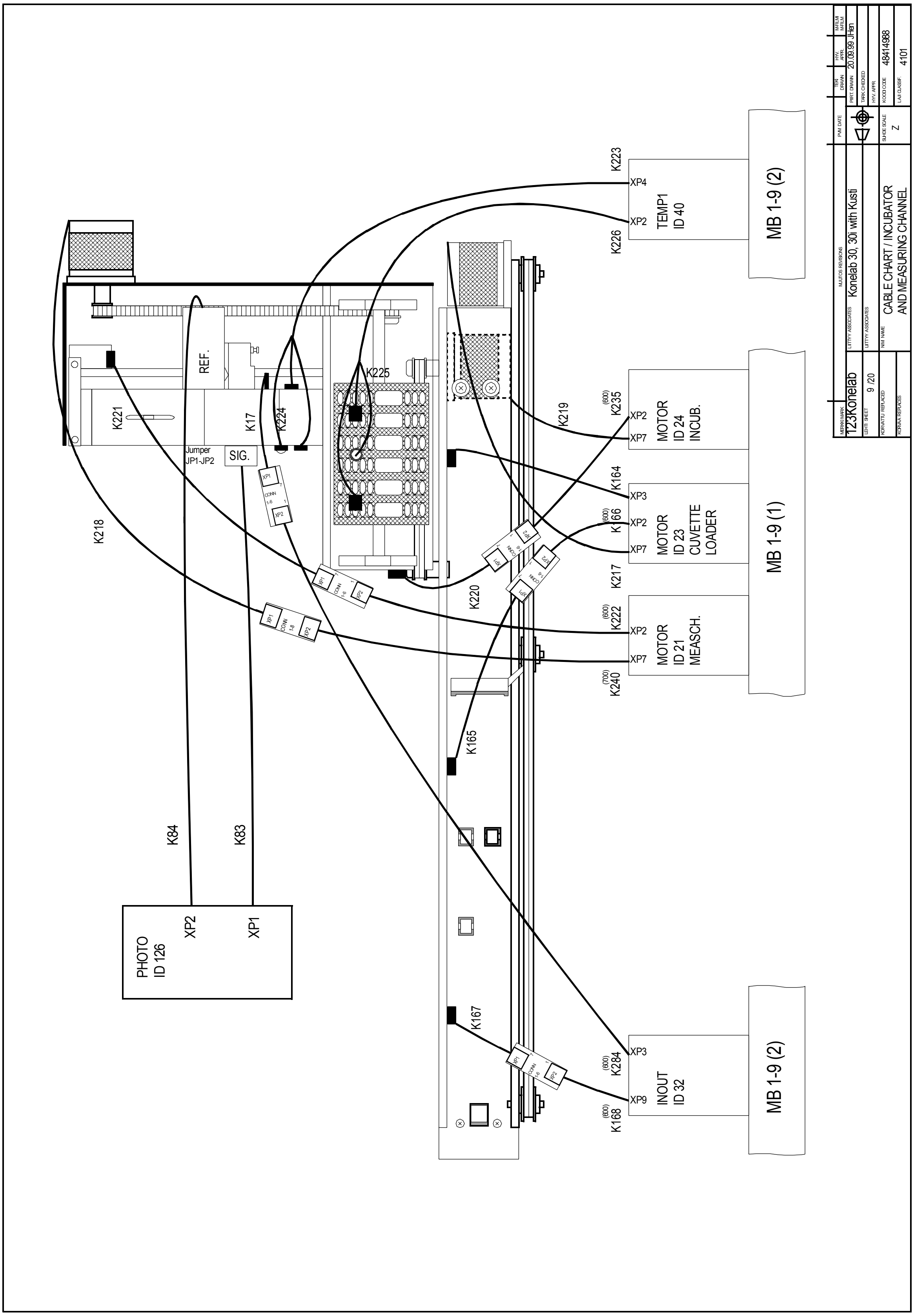


Figure 3-69 Incubator and measuring channel (30, 30i Kusti)

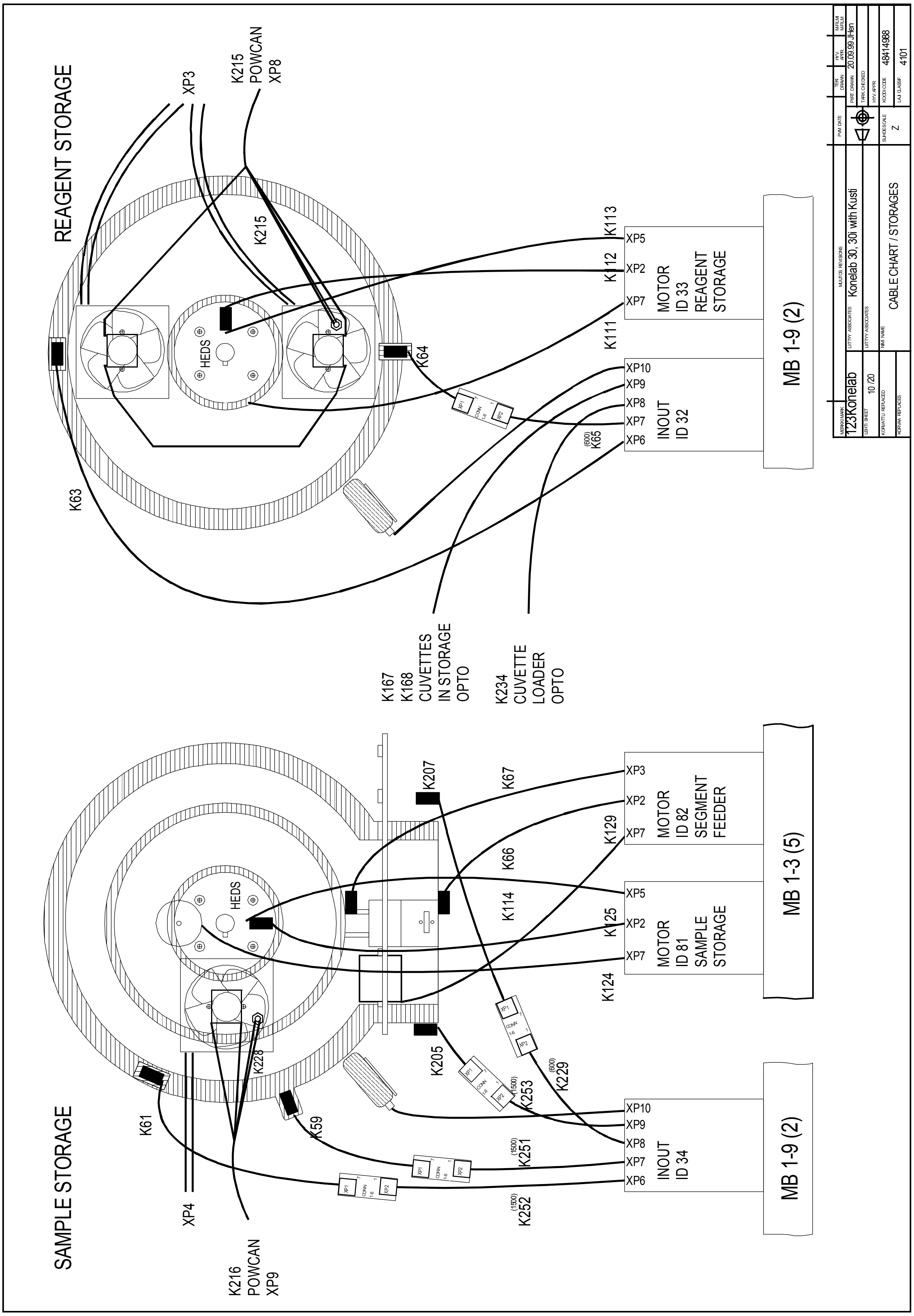


Figure 3-70 Storages (30, 30i Kusti)

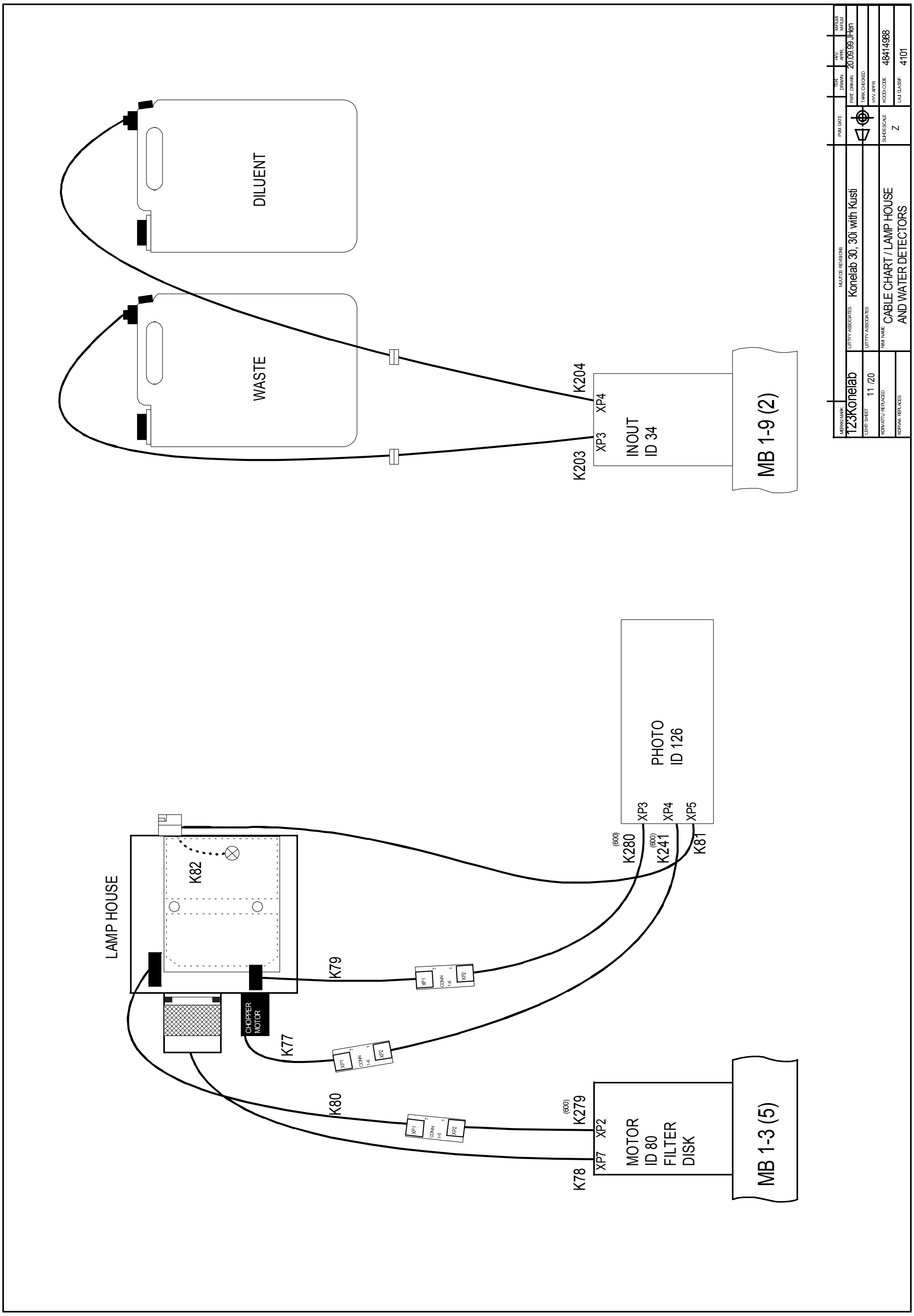


Figure 3-71 Lamp house and water detectors (30, 30i Kusti)

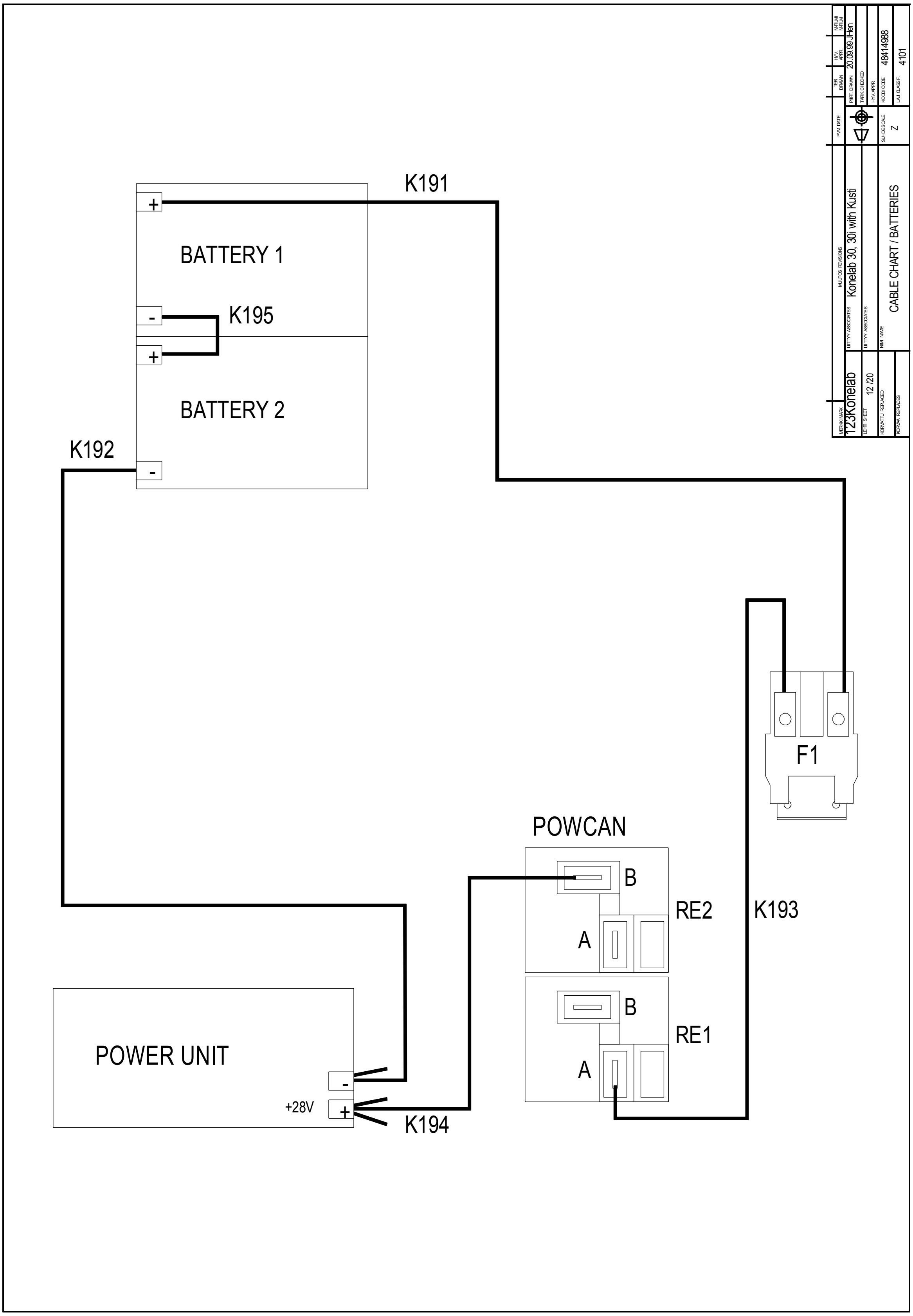


Figure 3-72 Batteries (30, 30i Kusti)

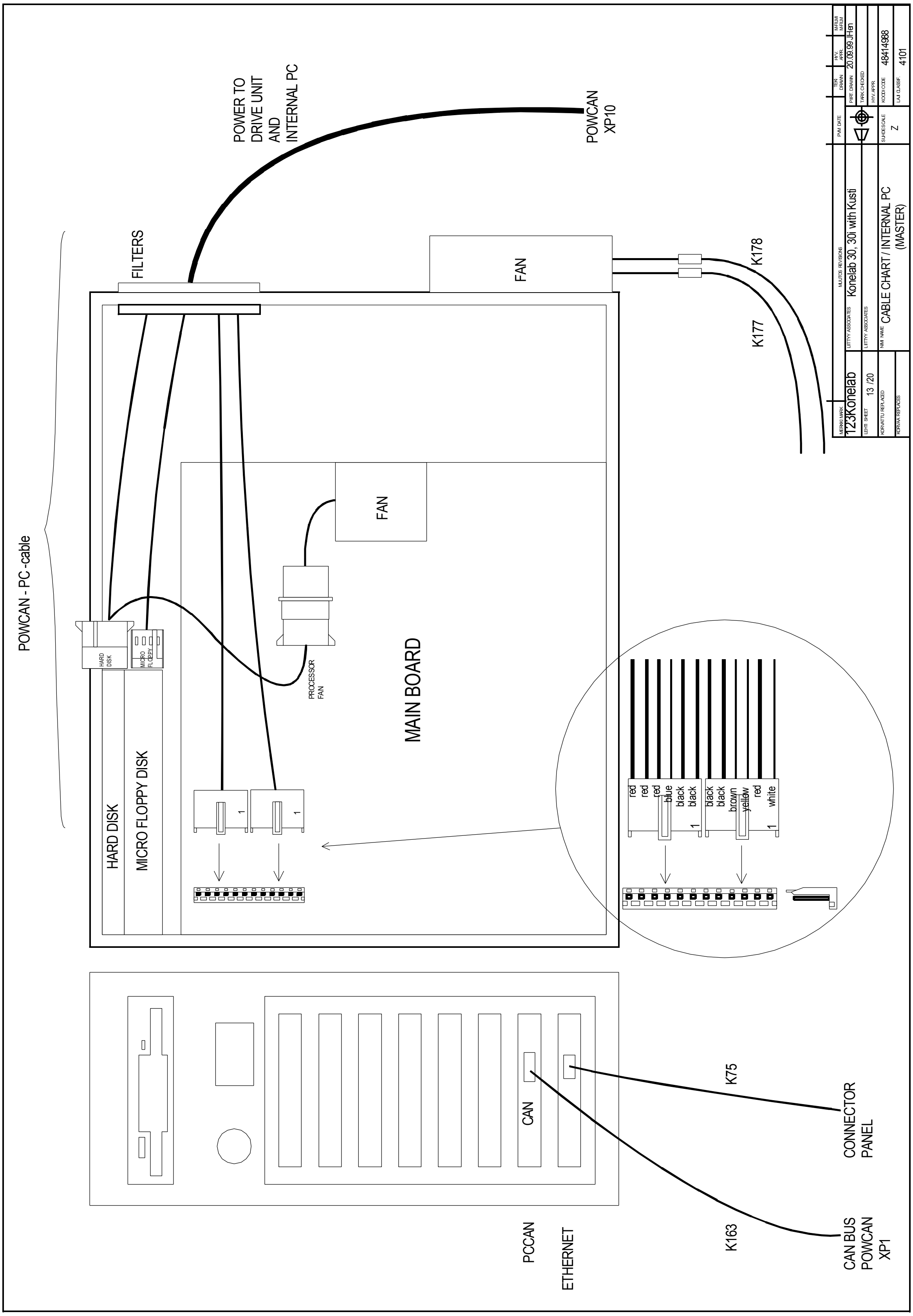


Figure 3-73 Internal PC (master) (30, 30i Kusti)

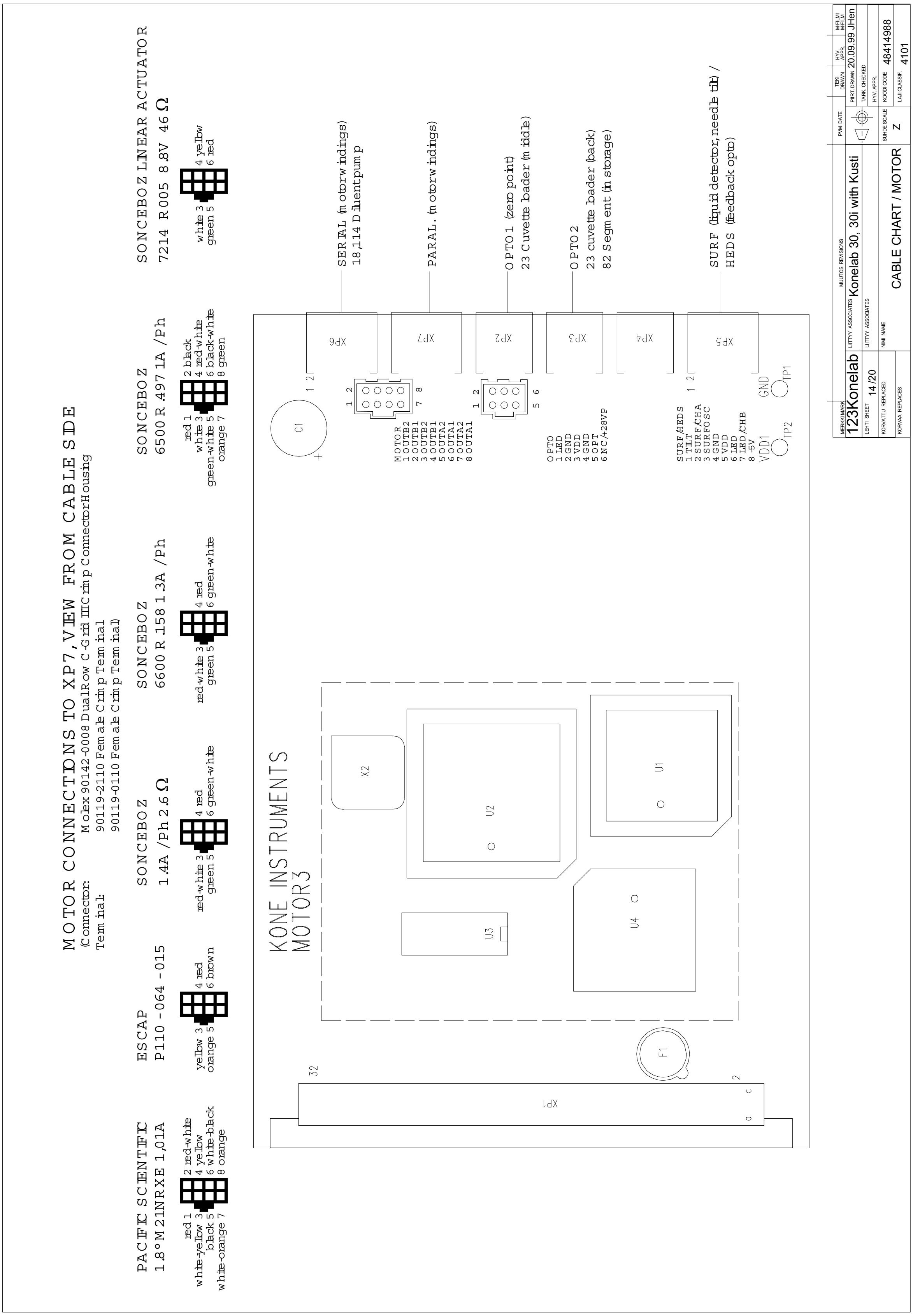


Figure 3-74 Motor (30, 30i Kusti)

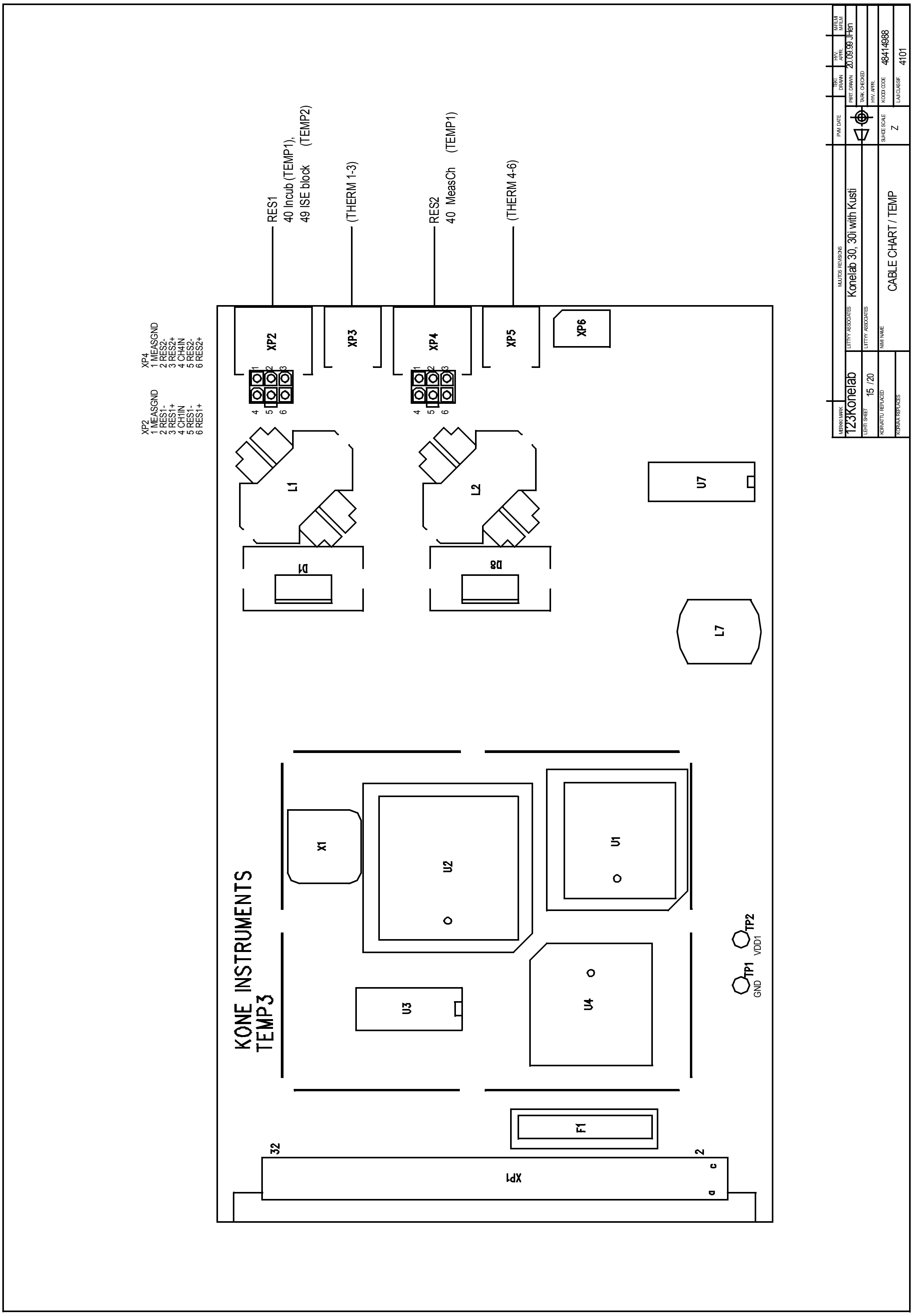


Figure 3-75 Temp (30, 30i Kusti)

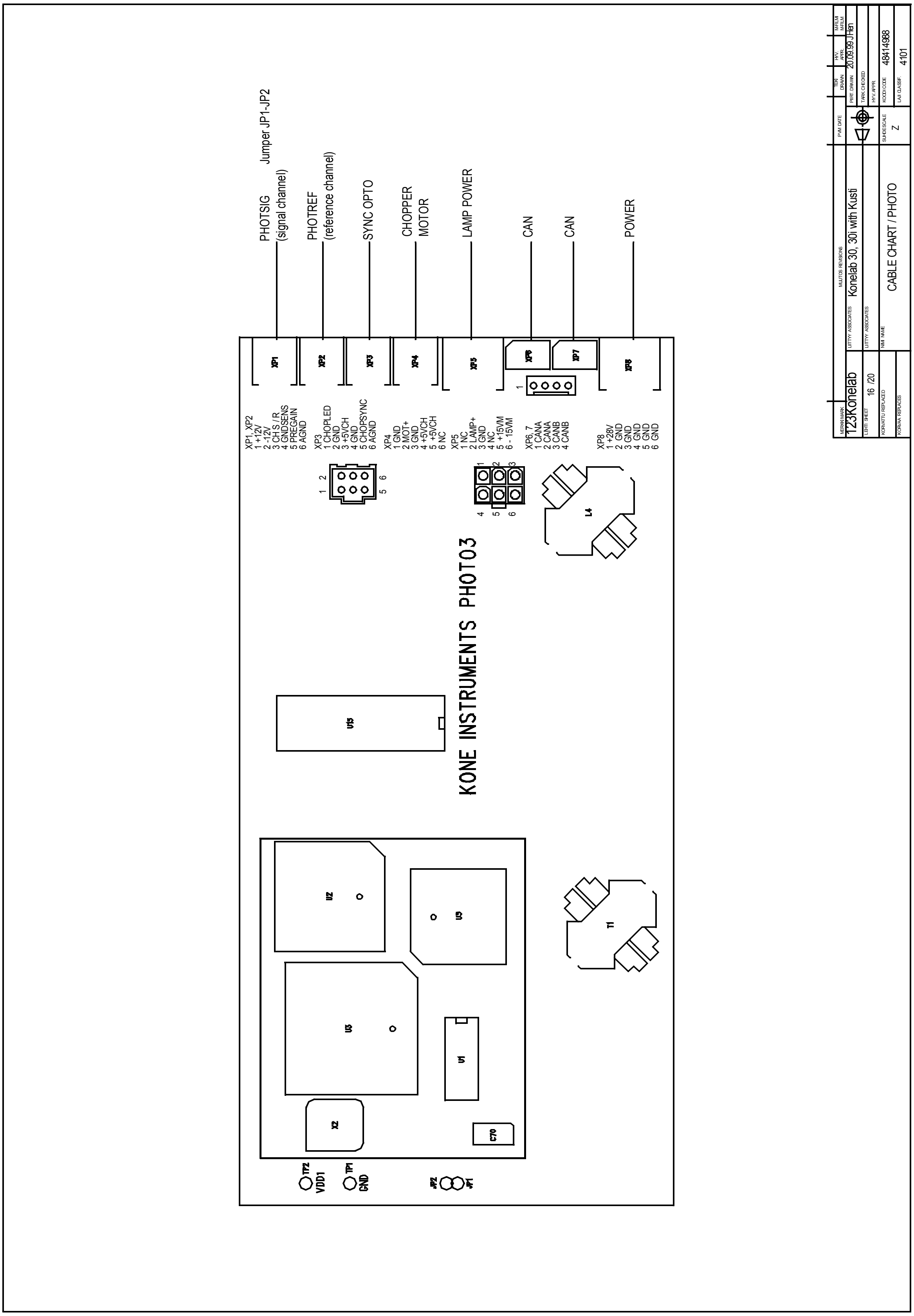


Figure 3-76 Photo (30, 30i Kusti)

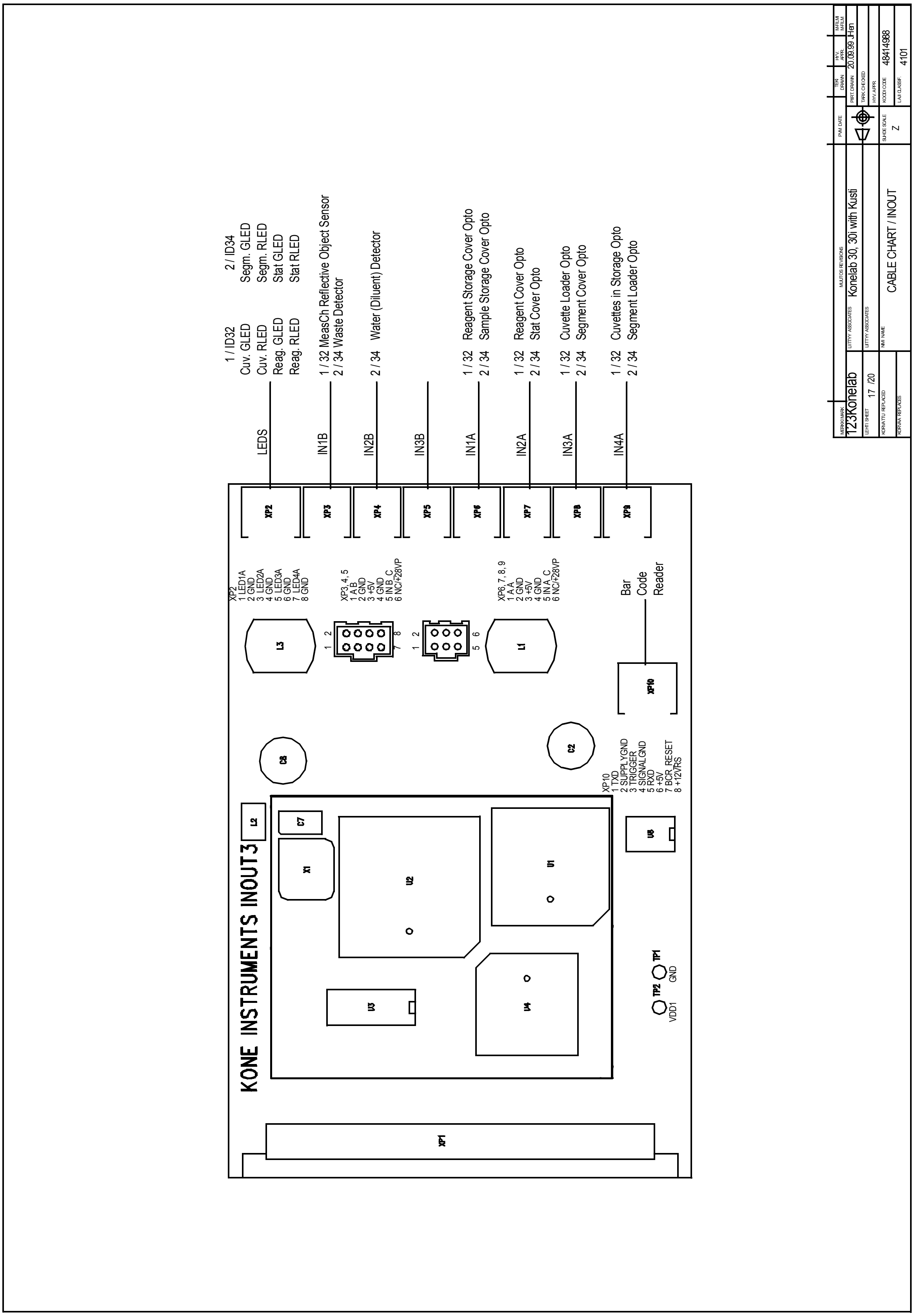


Figure 3-77 INOUT (30, 30i Kusti)

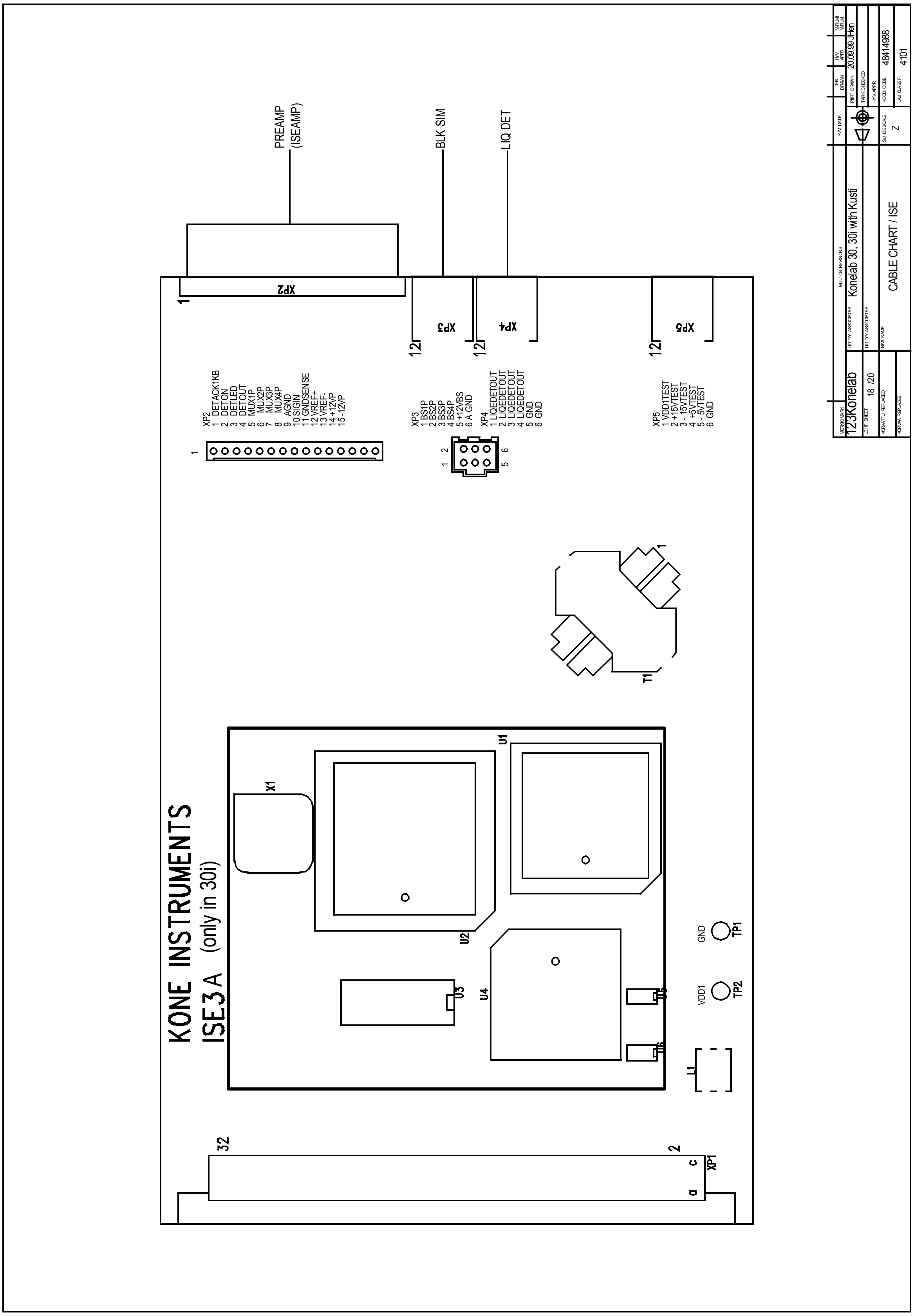


Figure 3-78 ISE (30, 30i Kusti)

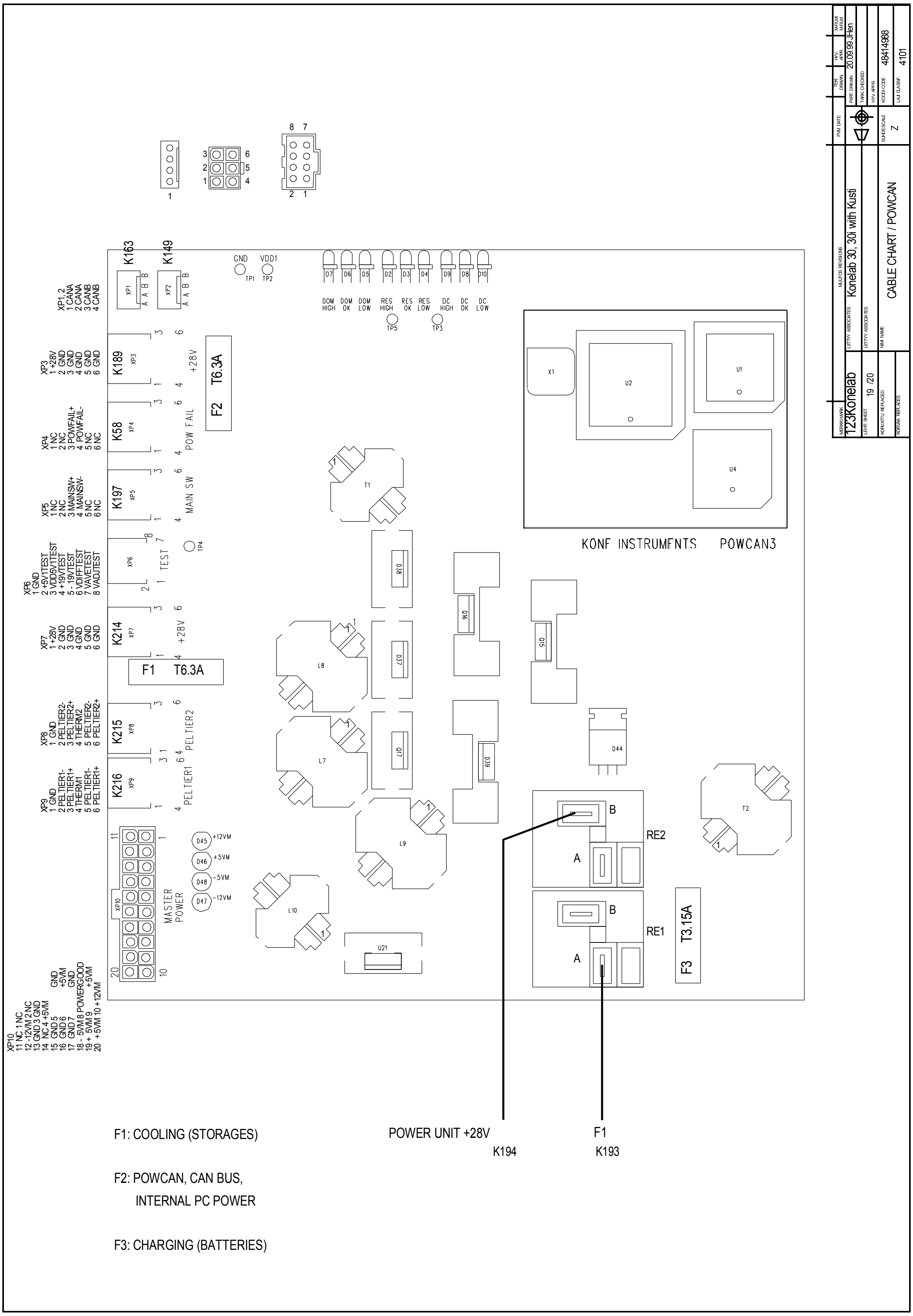


Figure 3-79 Powcan (30, 30i Kusti)

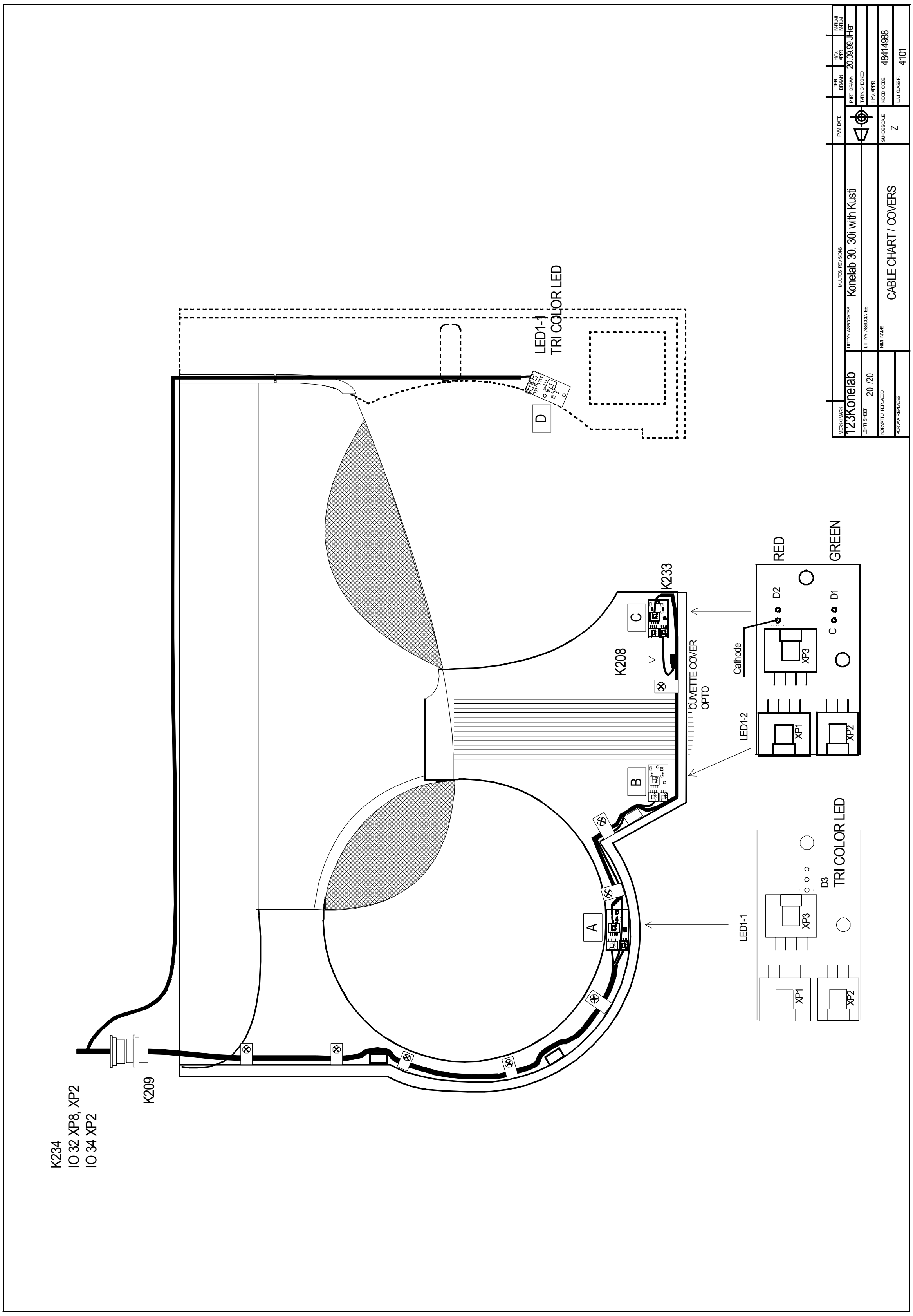


Figure 3-80 Covers (30, 30i Kusti)

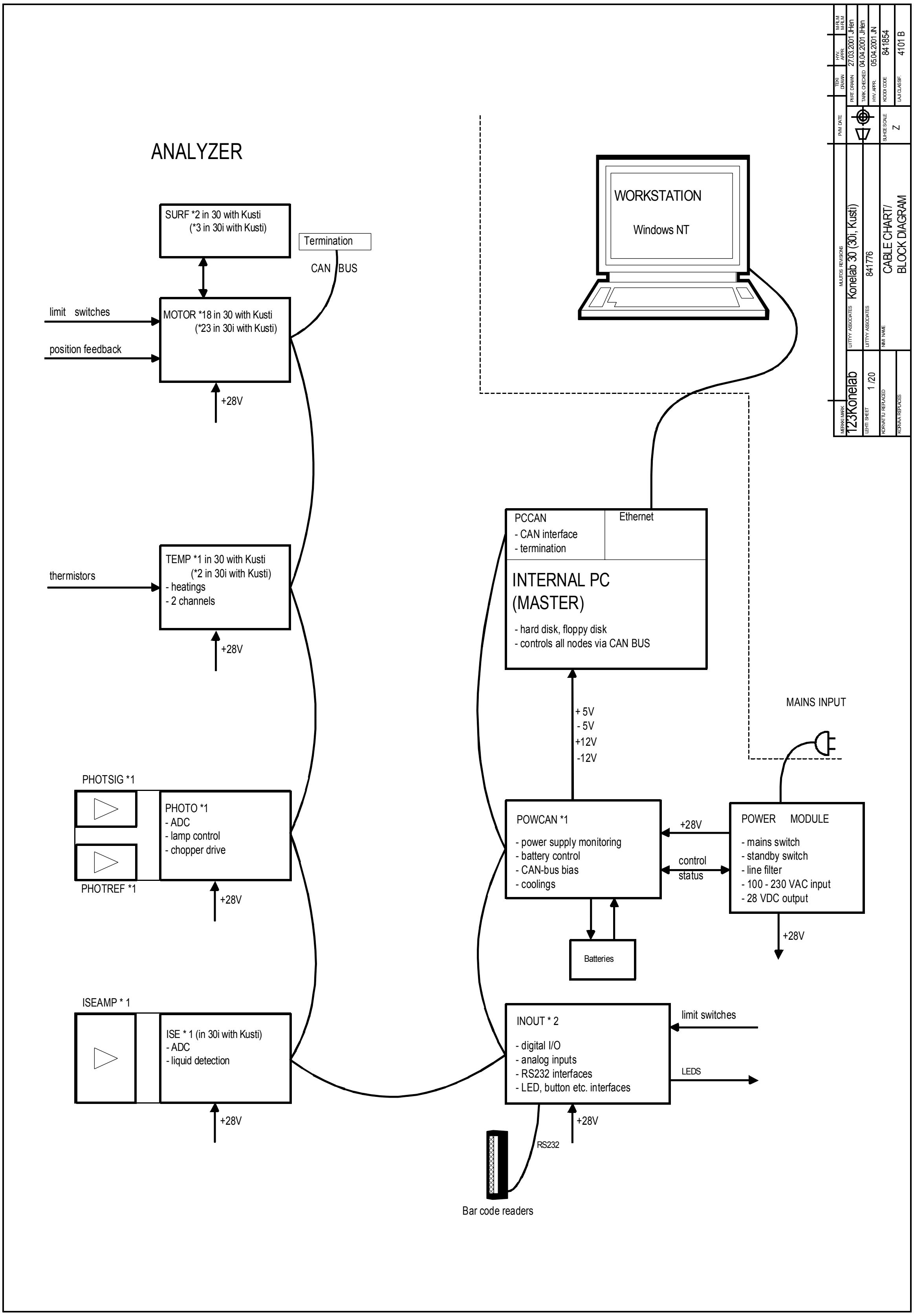


Figure 3-81 Block diagram (30, 30i, Kusti, (981850,981851, 981860, 981861))

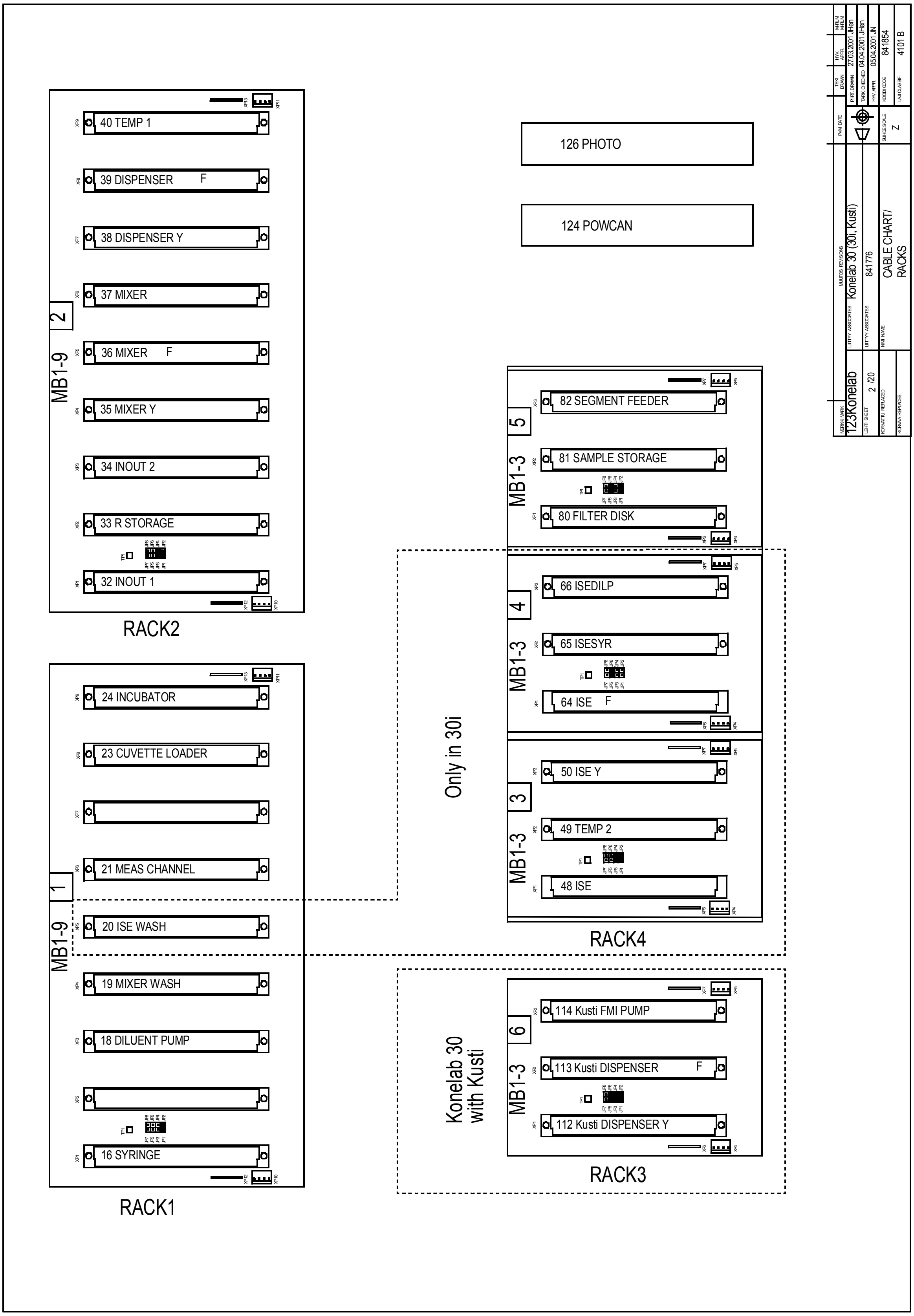


Figure 3-82 Racks (30, 30i, Kusti, (981850,981851, 981860, 981861))

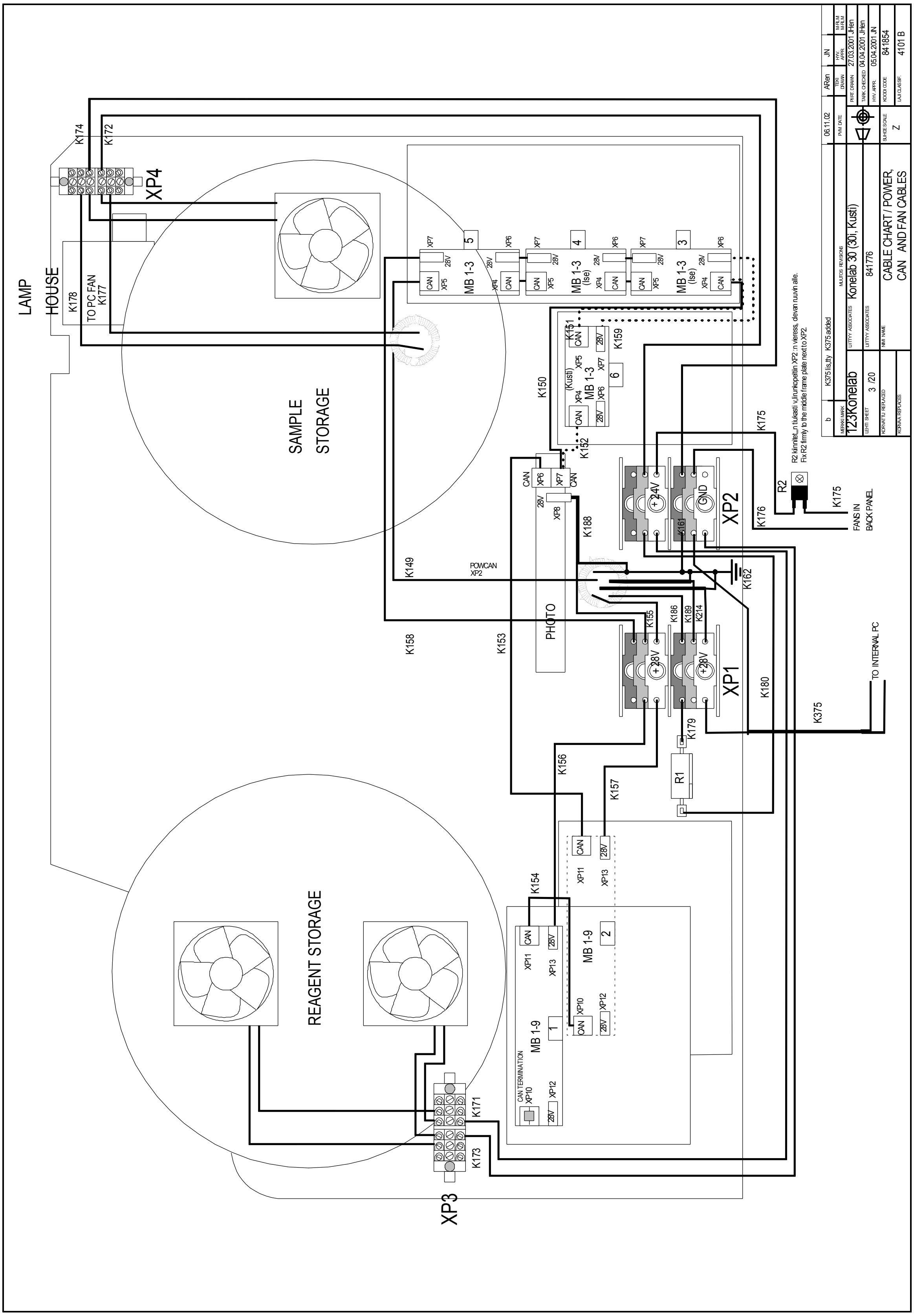


Figure 3-83 Power, can and fan cables (30, 30i, Kusti, (981850,981851, 981860, 981861))

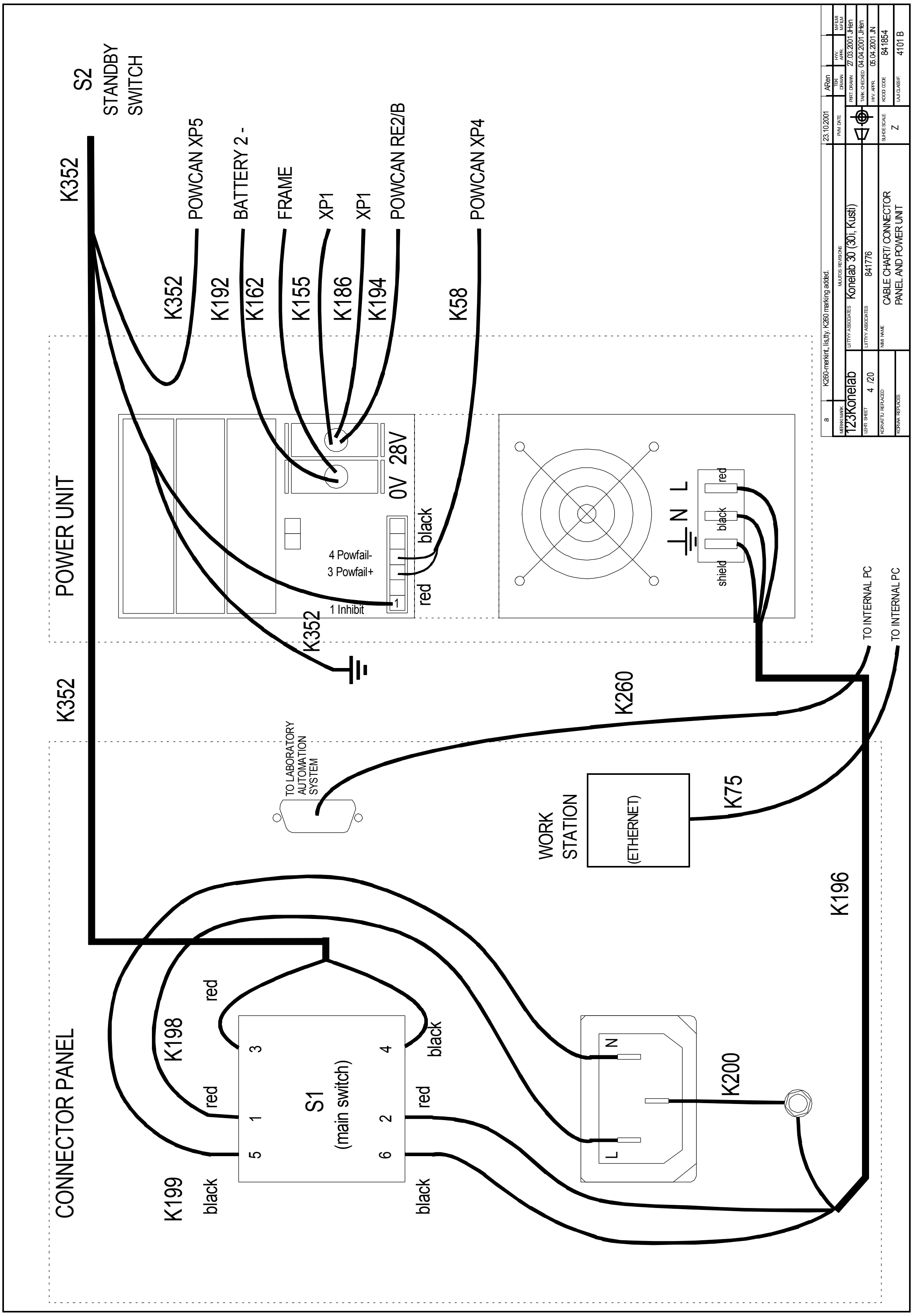


Figure 3-84 Connector panel and power unit (30, 30i, Kusti, (981850,981851, 981860, 981861))

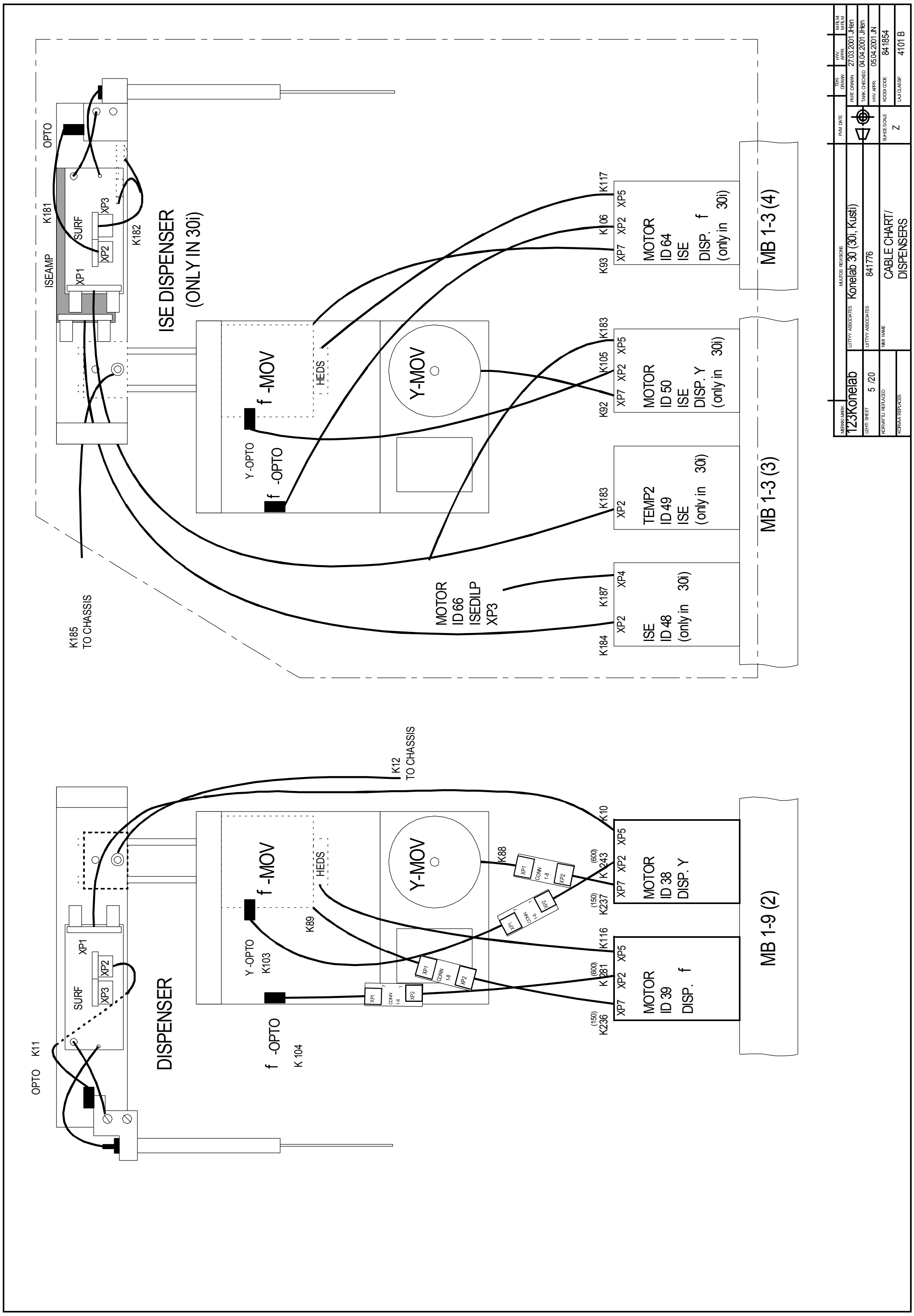


Figure 3-85 Dispensers (30, 30i, Kusti, (981850,981851, 981860, 981861))

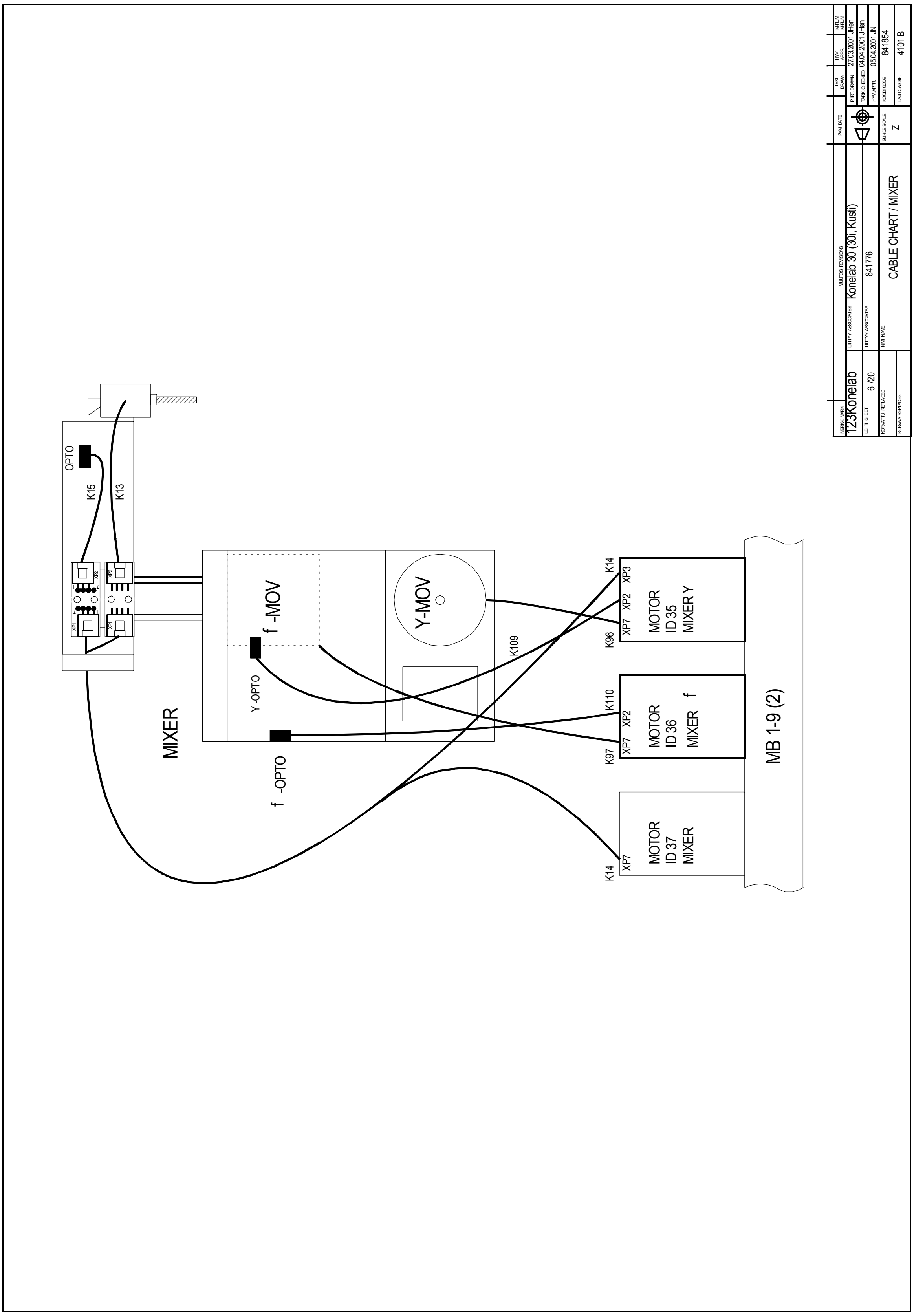


Figure 3-86 Mixer (30, 30i, Kusti, (981850,981851, 981860, 981861))

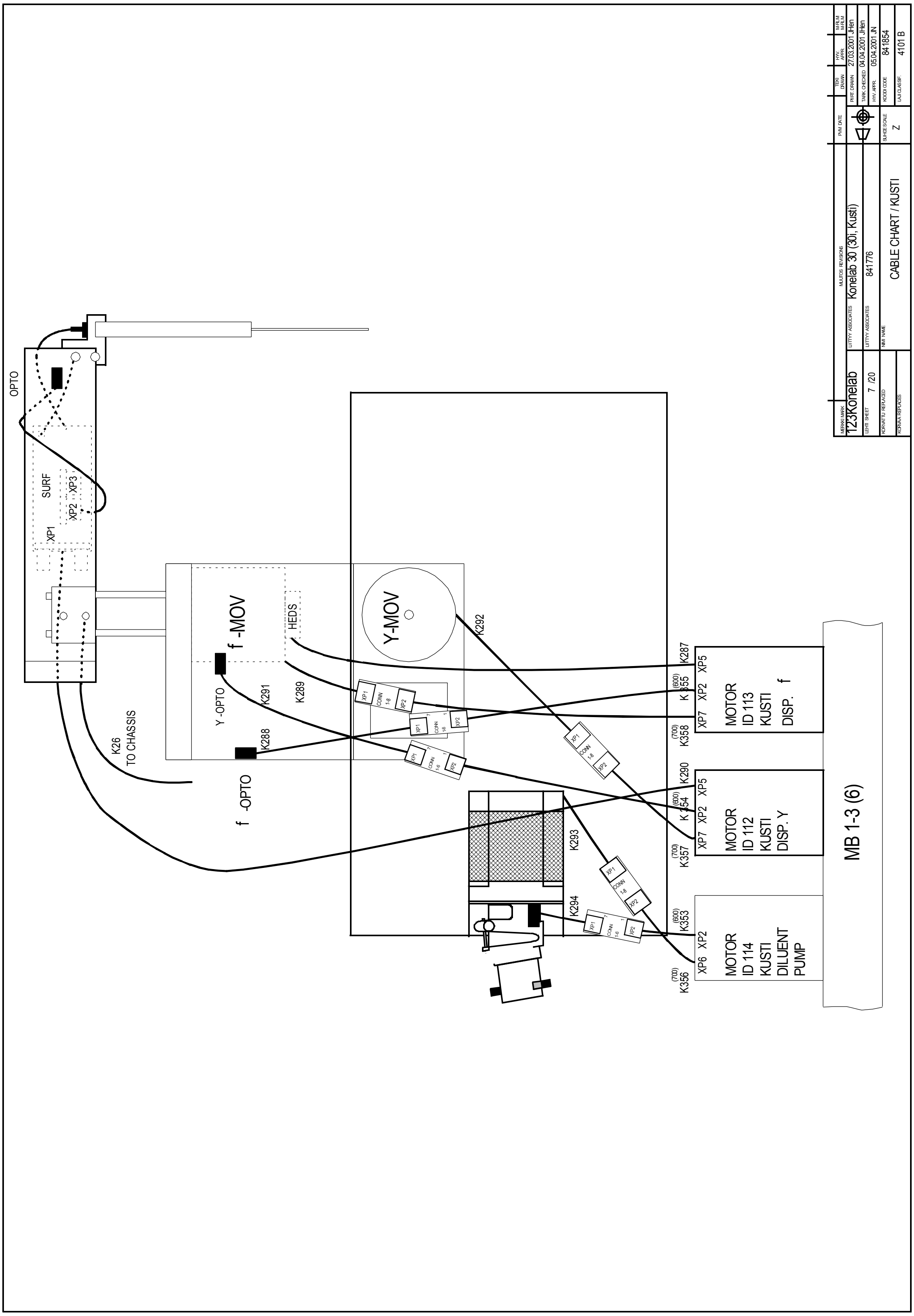


Figure 3-87 Kusti (30, 30i, Kusti, (981850,981851, 981860, 981861))

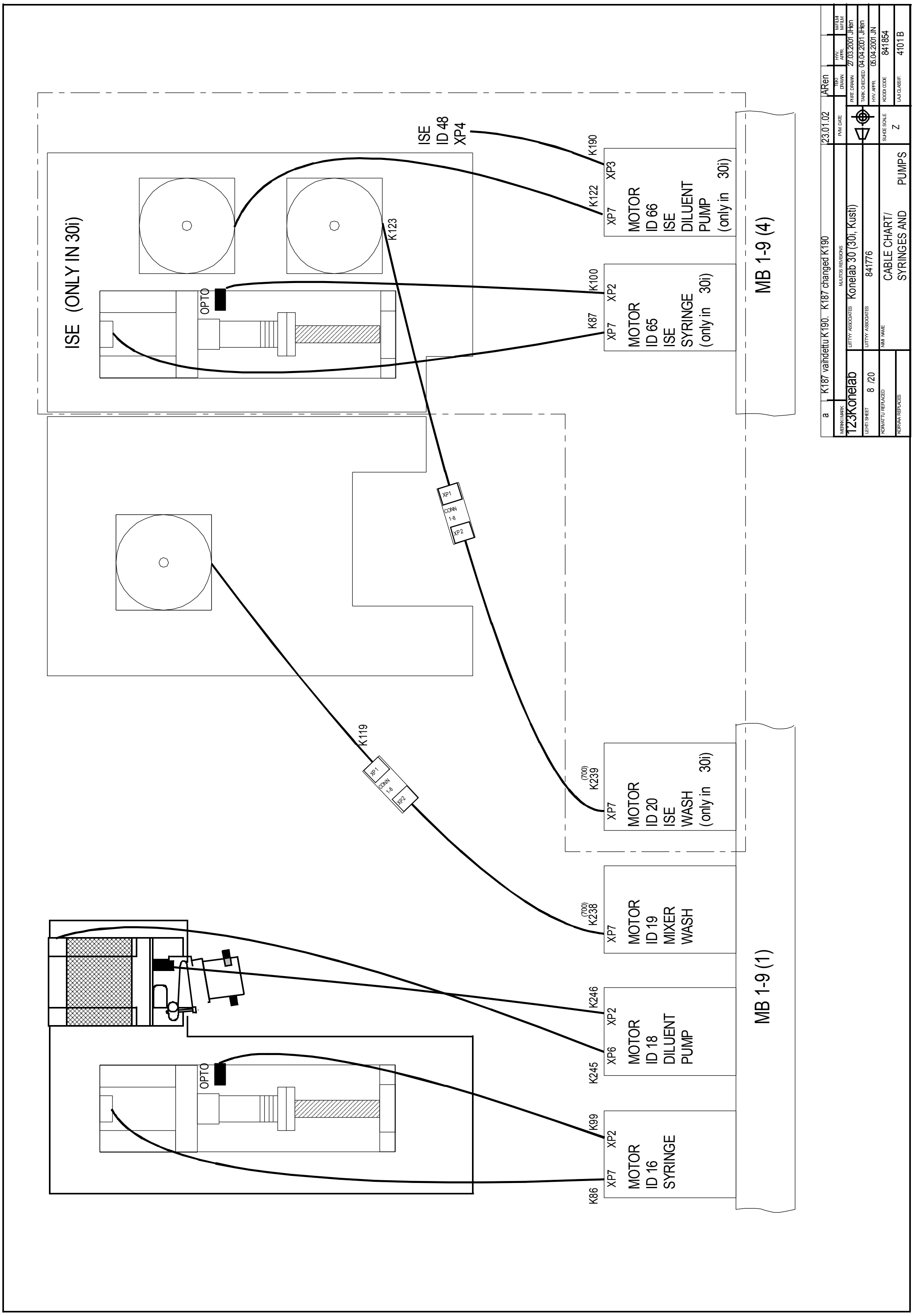


Figure 3-88 Syringes and pumps (30, 30i, Kusti, (981850,981851, 981860, 981861))

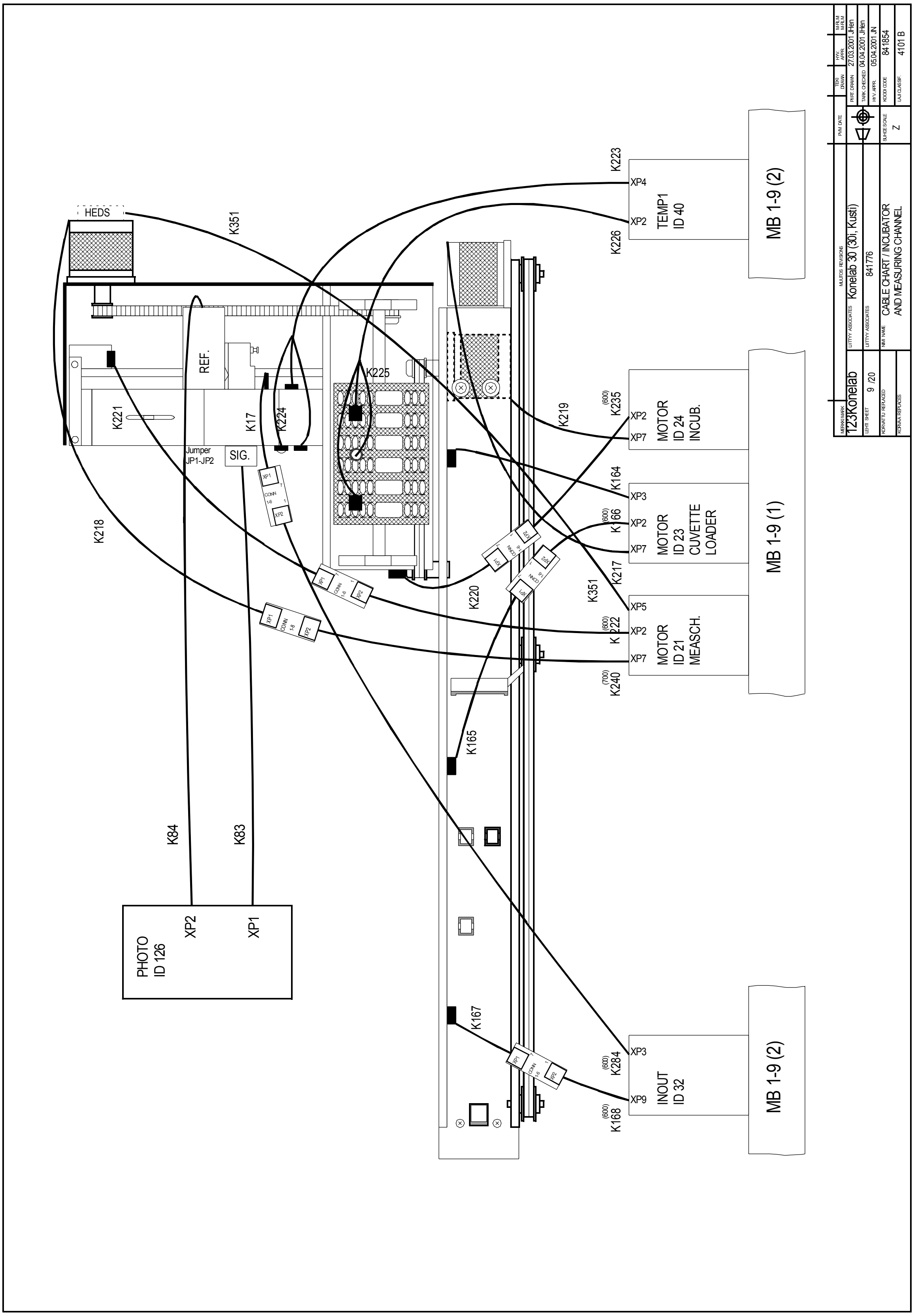


Figure 3-89 Incubator and measuring channel (30, 30i, Kusti, (981850,981851, 981860, 981861))

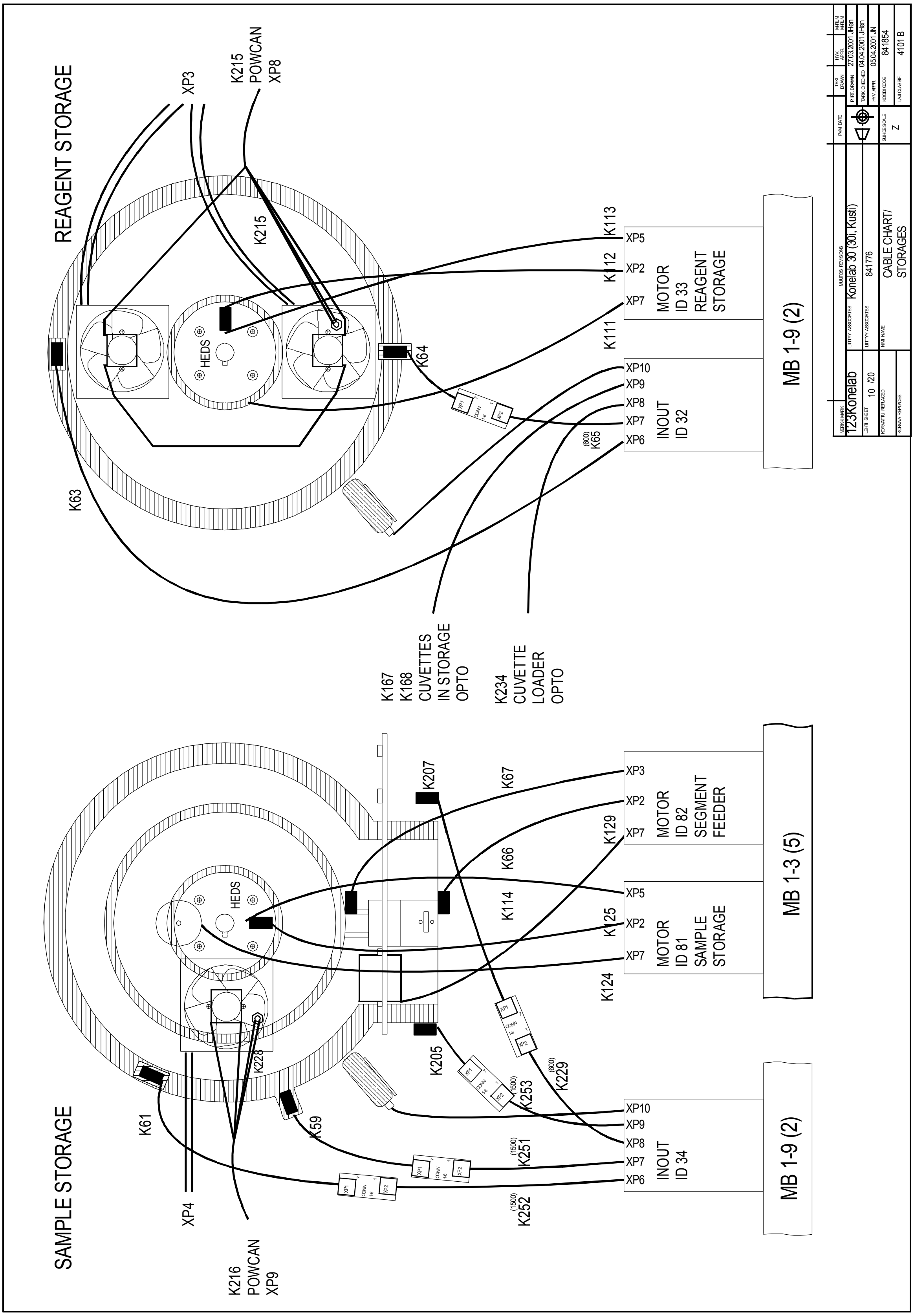


Figure 3-90 Storages (30, 30i, Kusti, (981850,981851, 981860, 981861))

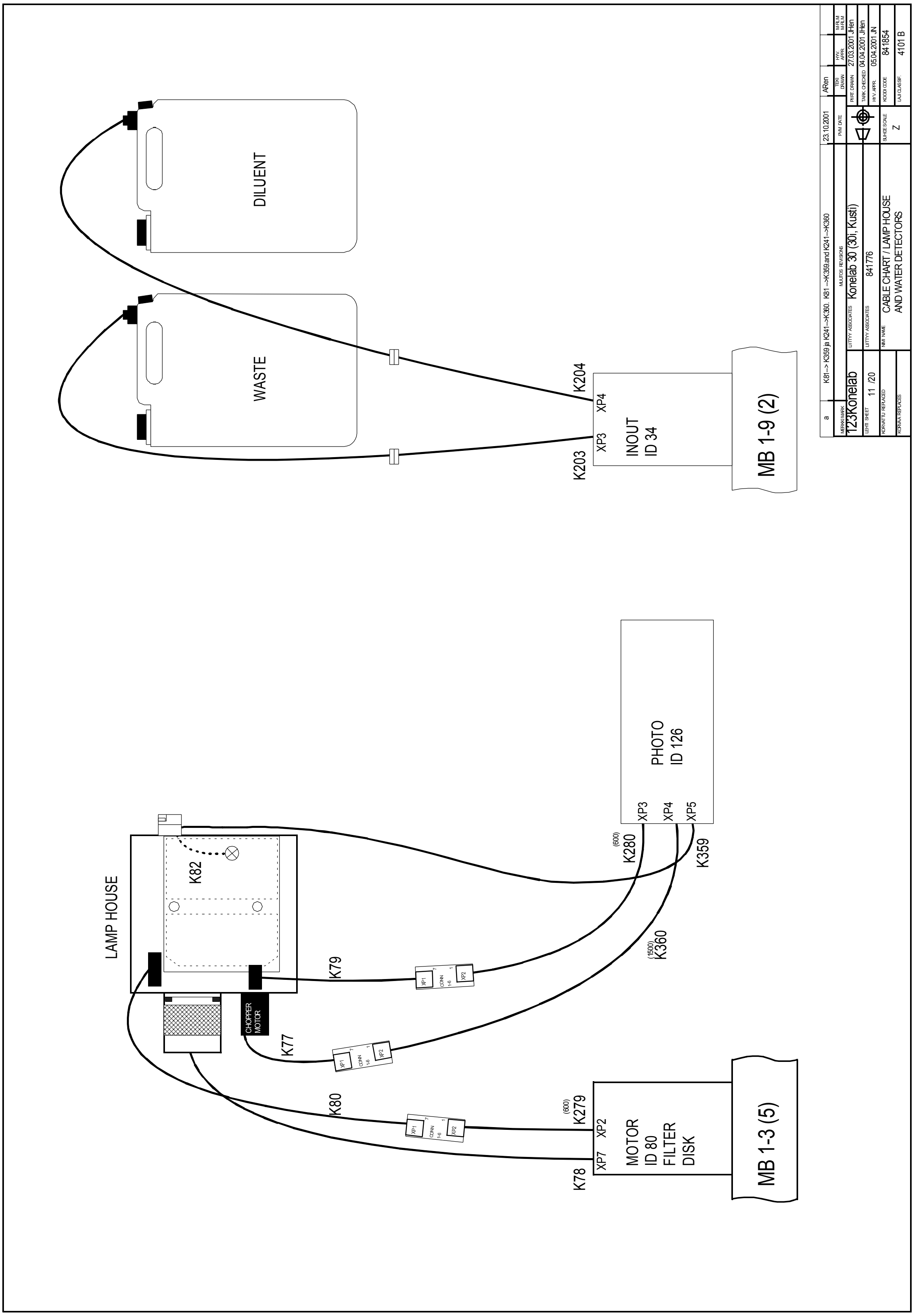


Figure 3-91 Lamp house and water detectors (30, 30i, Kusti, (981850,981851, 981860, 981861))

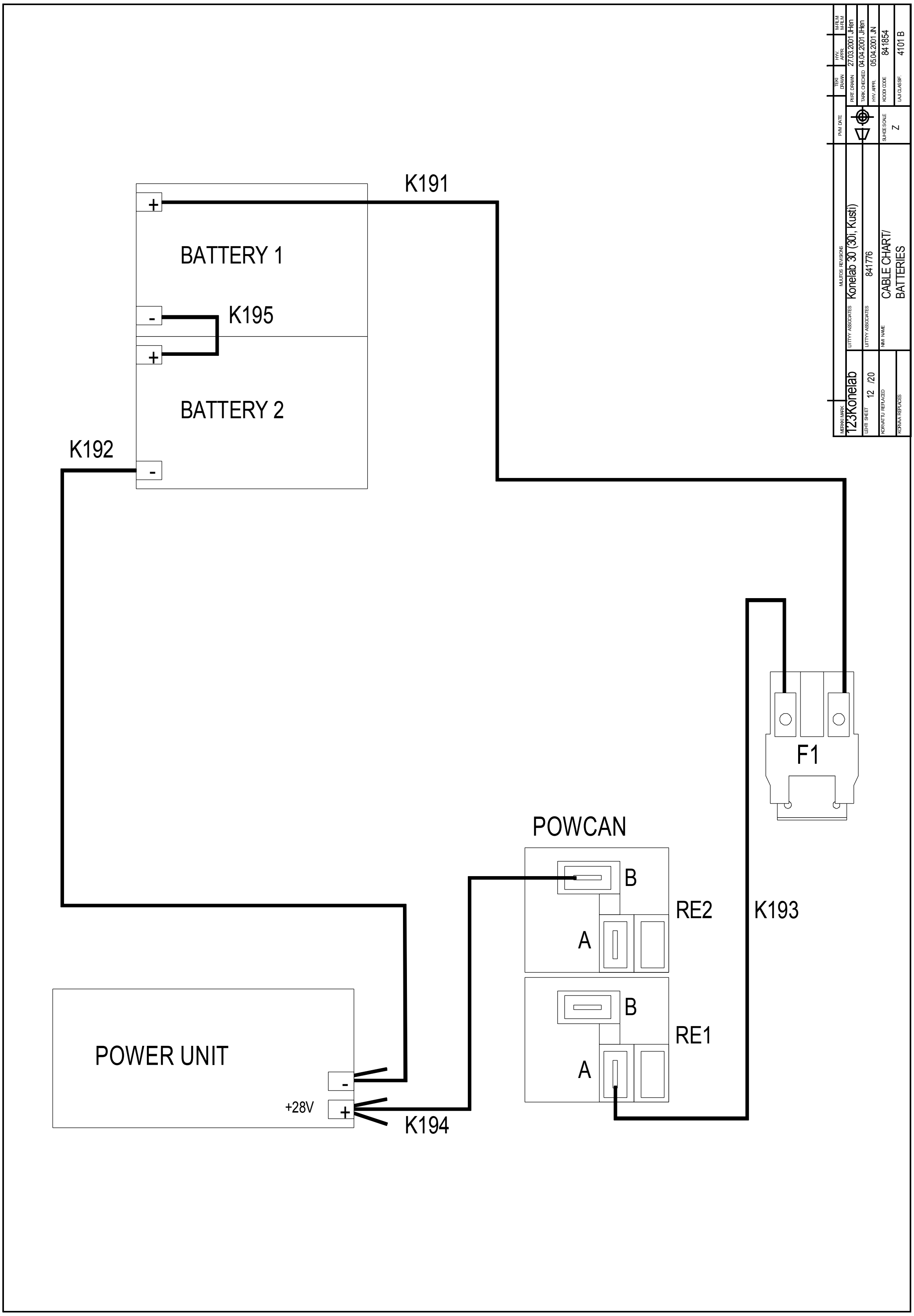


Figure 3-92 Batteries (30, 30i, Kusti, (981850,981851, 981860, 981861))

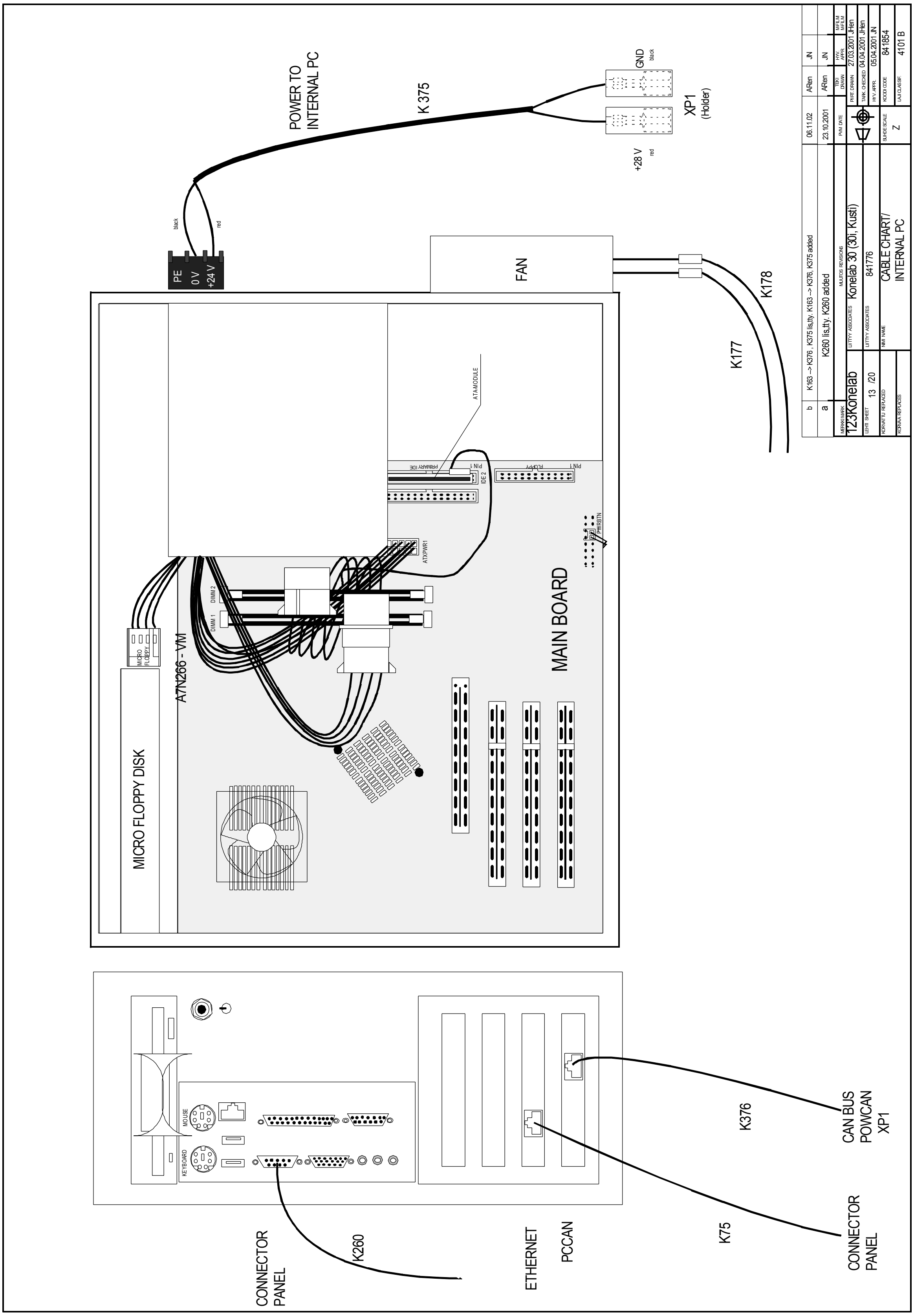


Figure 3-93 Internal PC (master) (30, 30i, Kusti, (981850,981851, 981860, 981861))

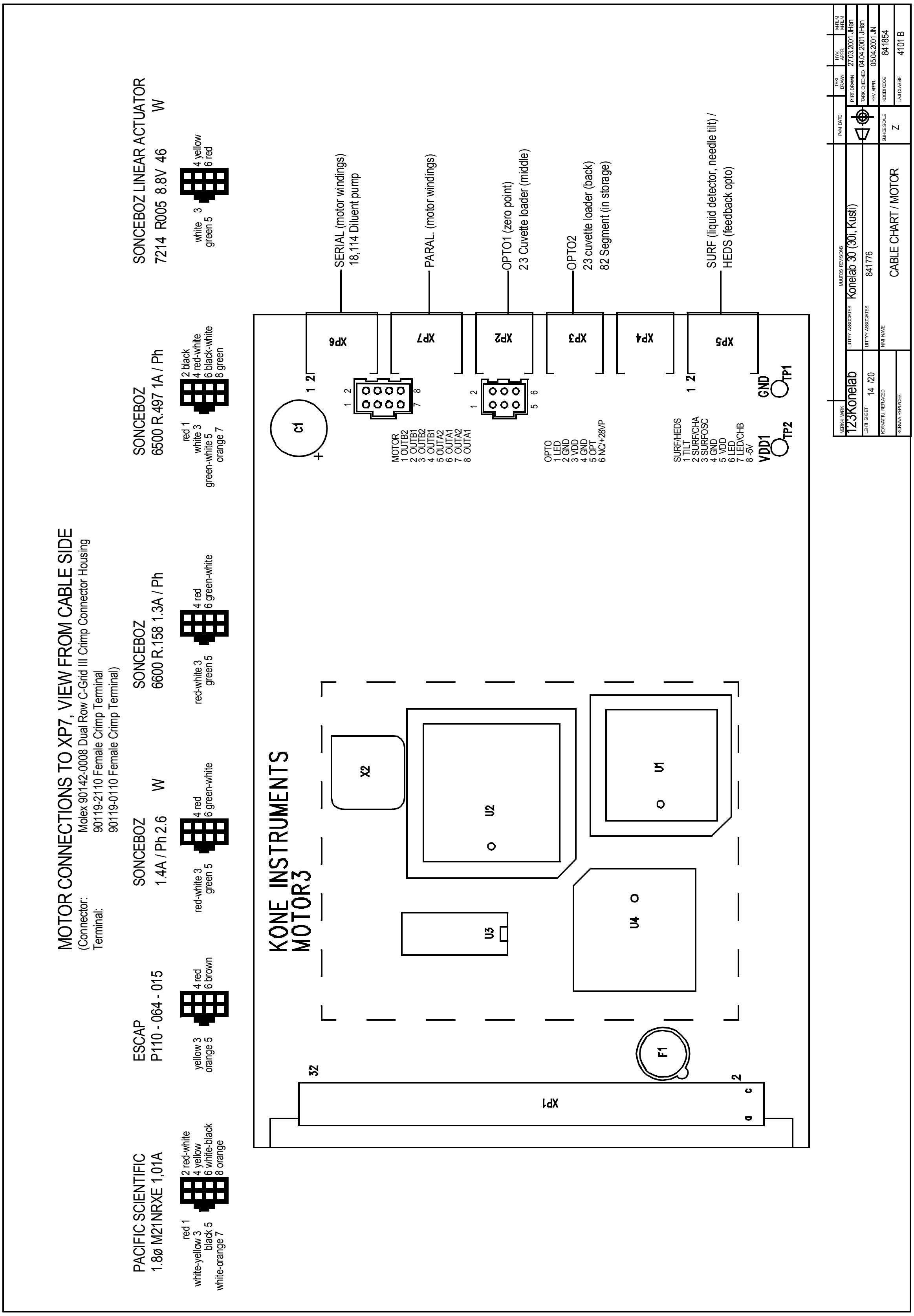


Figure 3-94 Motor (30, 30i, Kusti, (981850,981851, 981860, 981861))

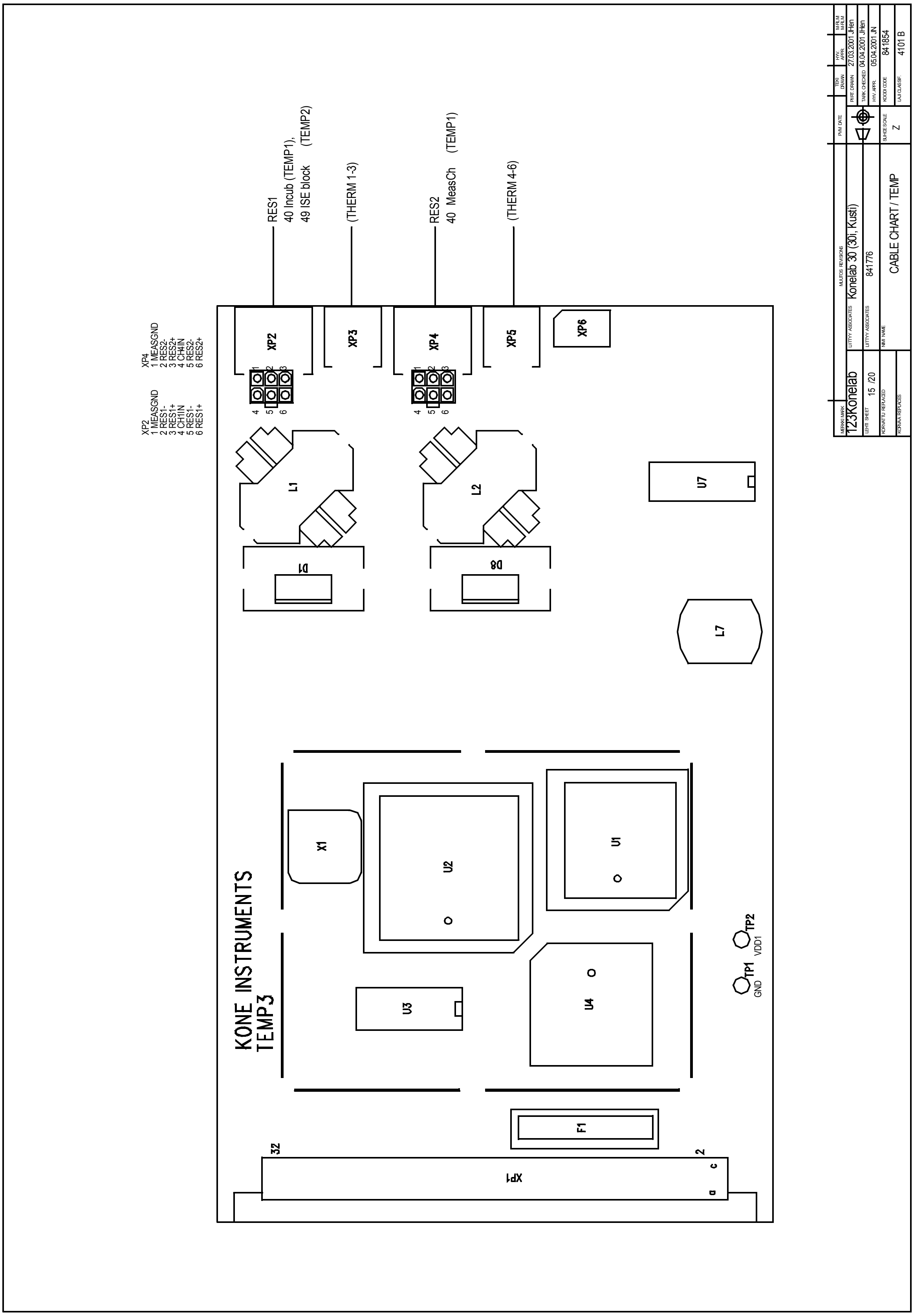


Figure 3-95 Temp (30, 30i, Kusti, (981850,981851, 981860, 981861))

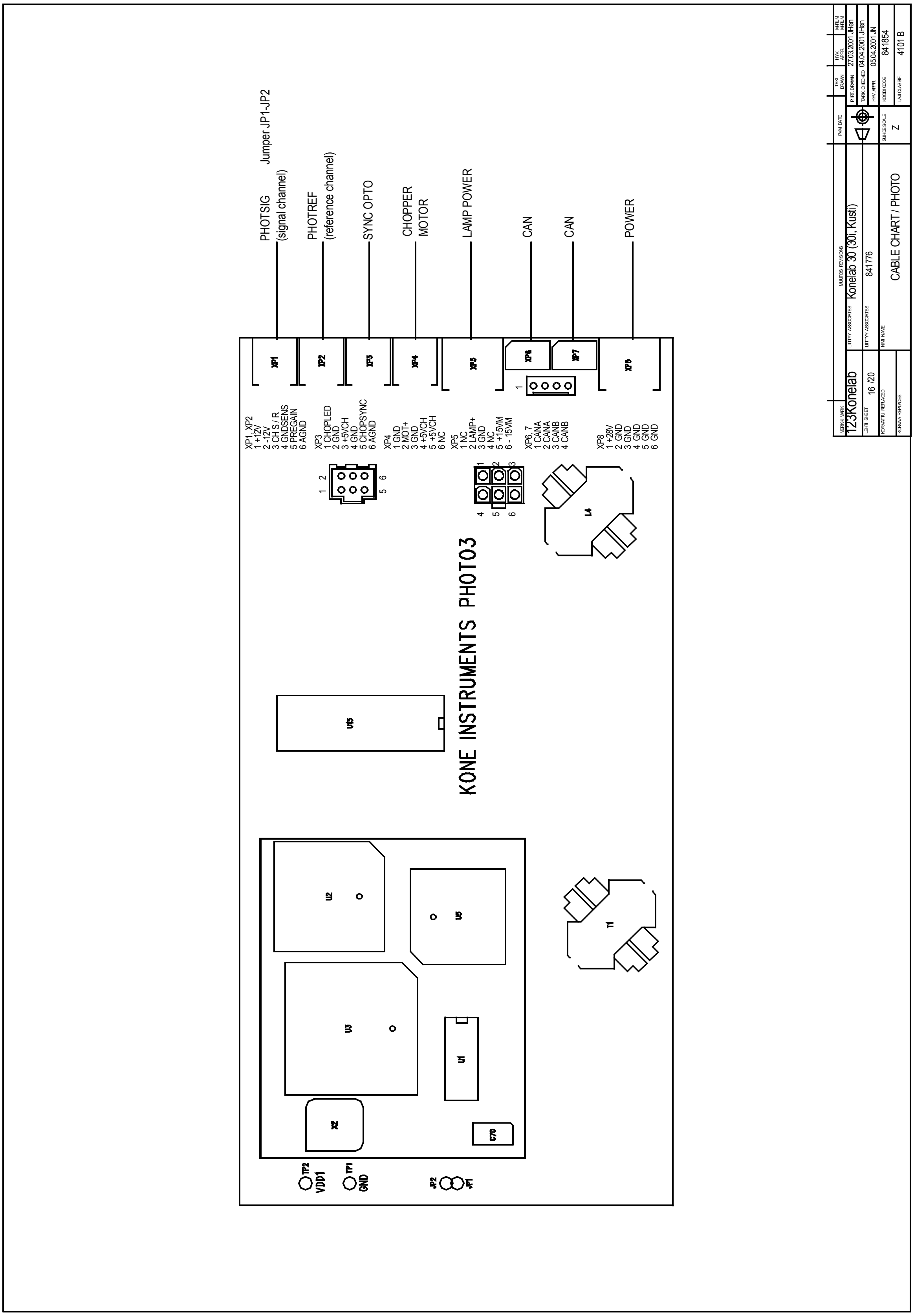


Figure 3-96 Photo (30, 30i, Kusti, (981850,981851, 981860, 981861))

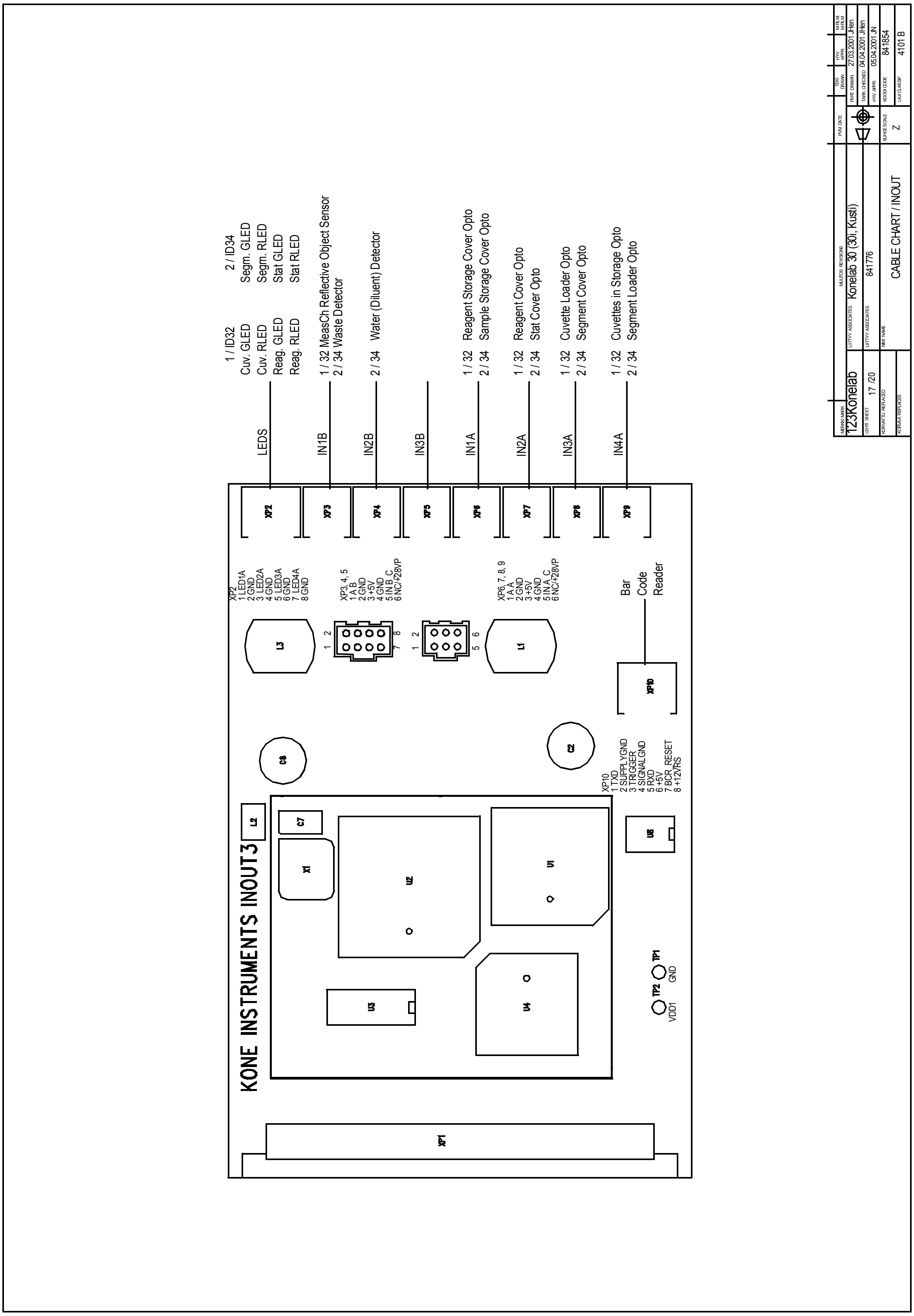


Figure 3-97 INOUT (30, 30i, Kusti, (981850,981851, 981860, 981861))

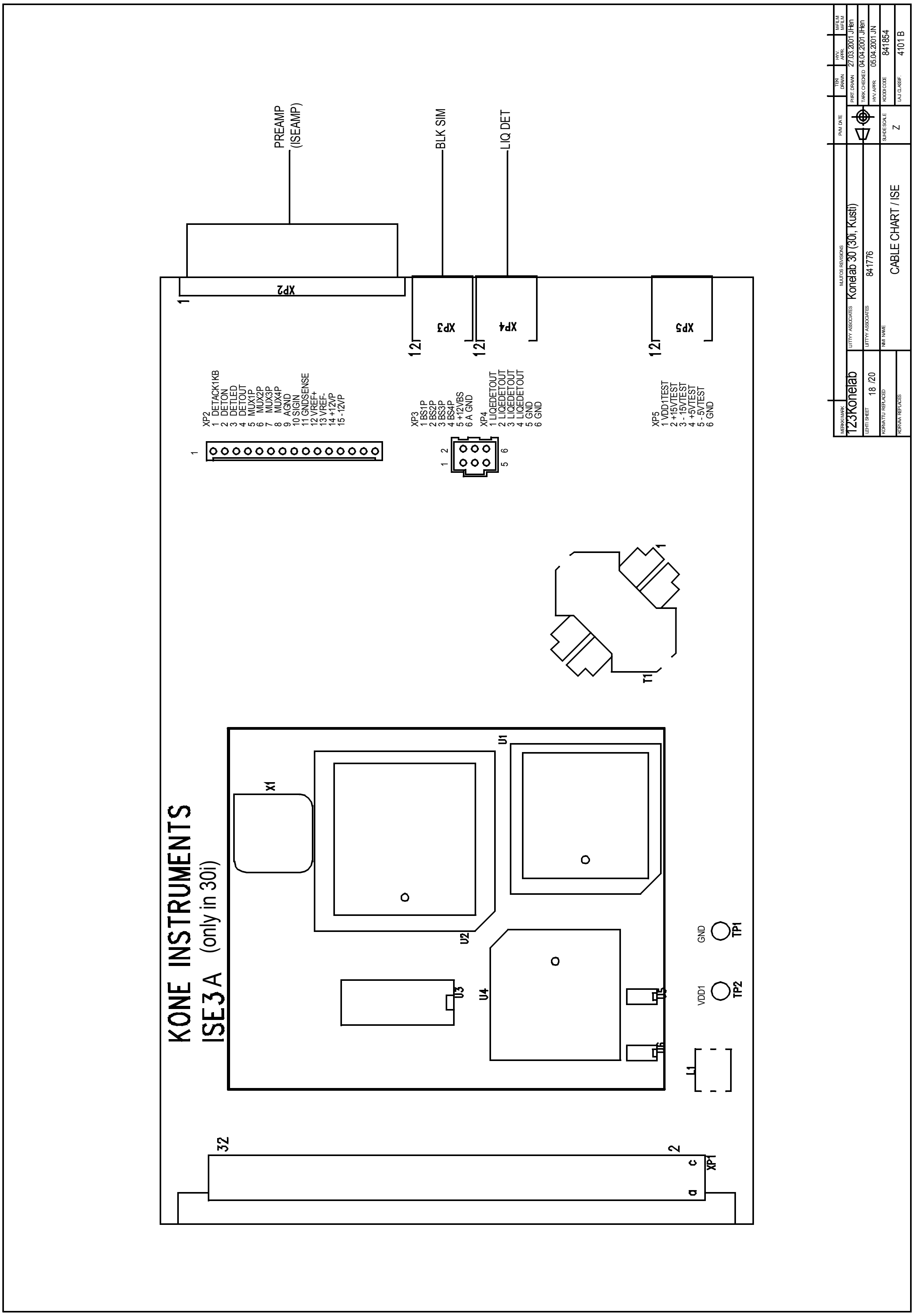


Figure 3-98 ISE (30, 30i, Kusti, (981850,981851, 981860, 981861))

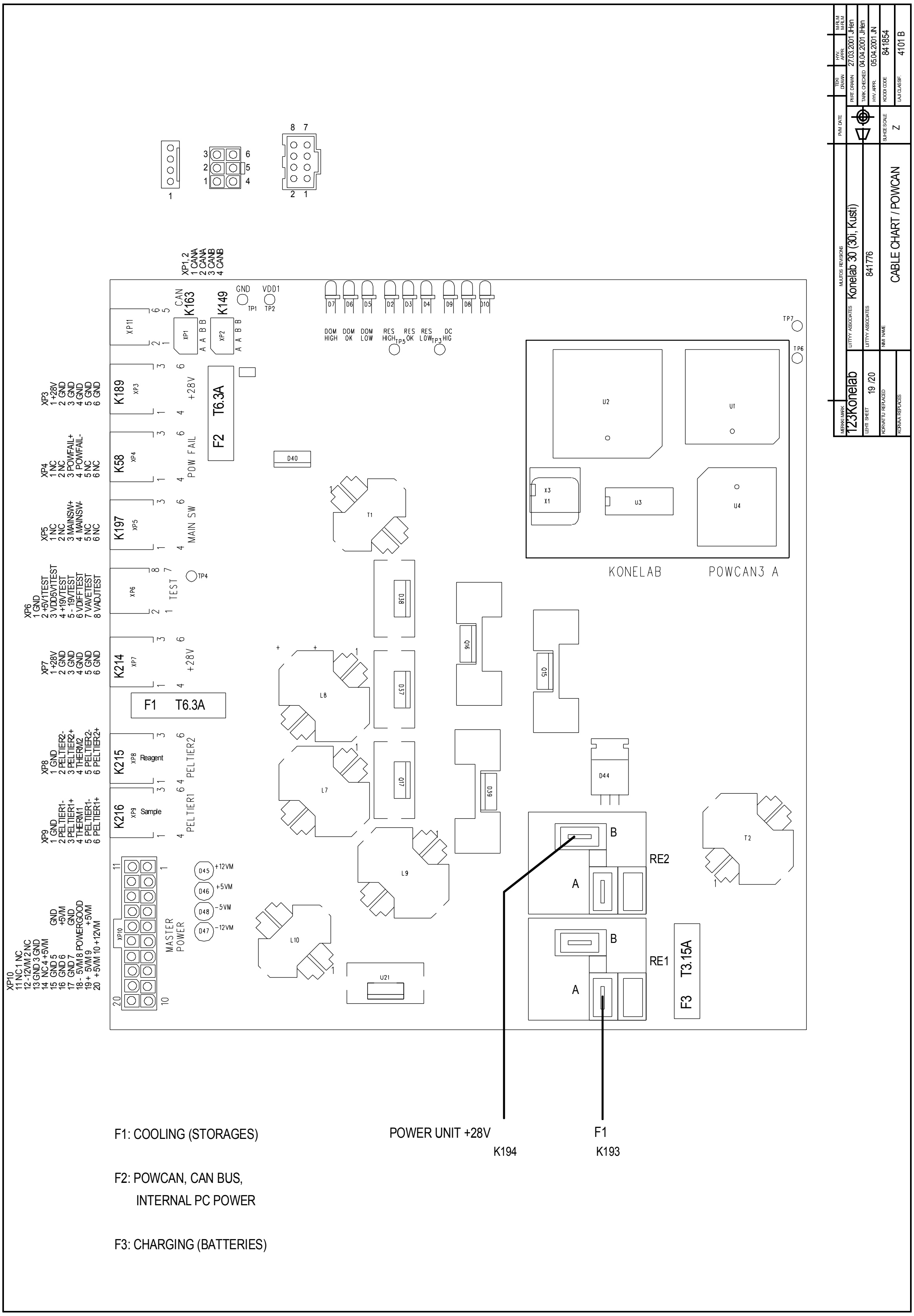


Figure 3-99 POWCAN (30, 30i, Kusti, (981850,981851, 981860, 981861))

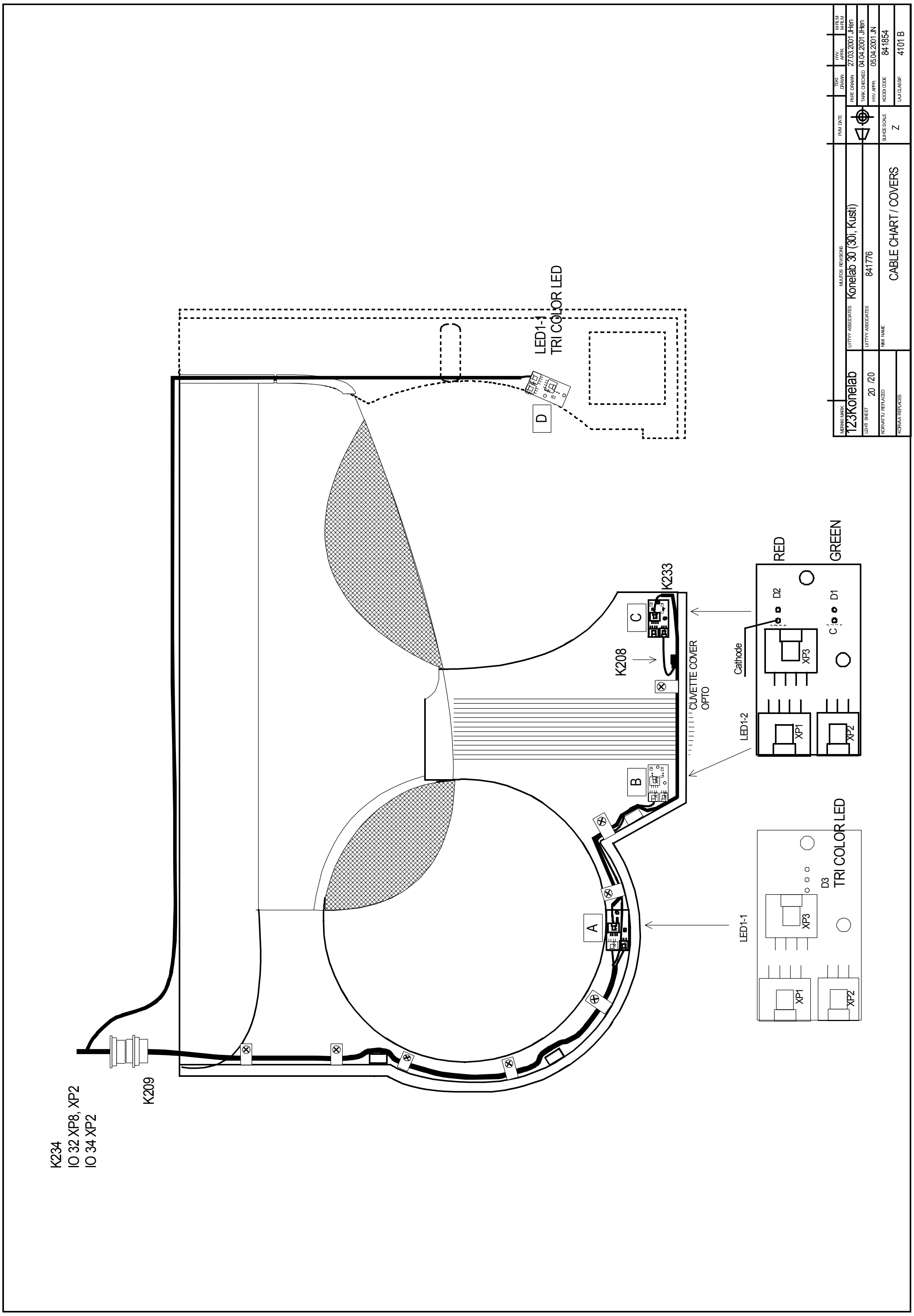


Figure 3-100 Covers (30, 30i, Kusti, (981850,981851, 981860, 981861))

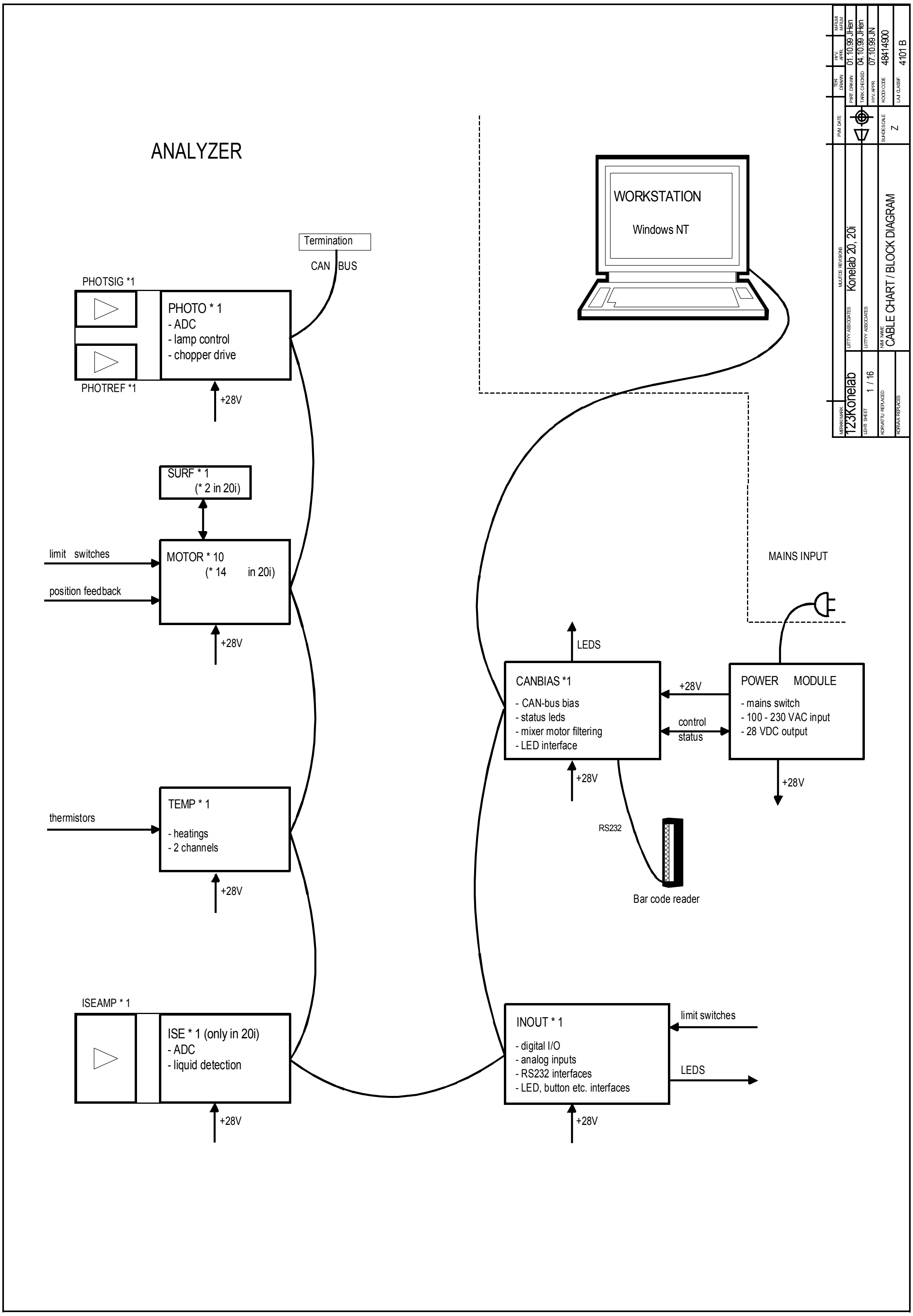


Figure 3-101 Block Diagram (Konelab 20, 20i)

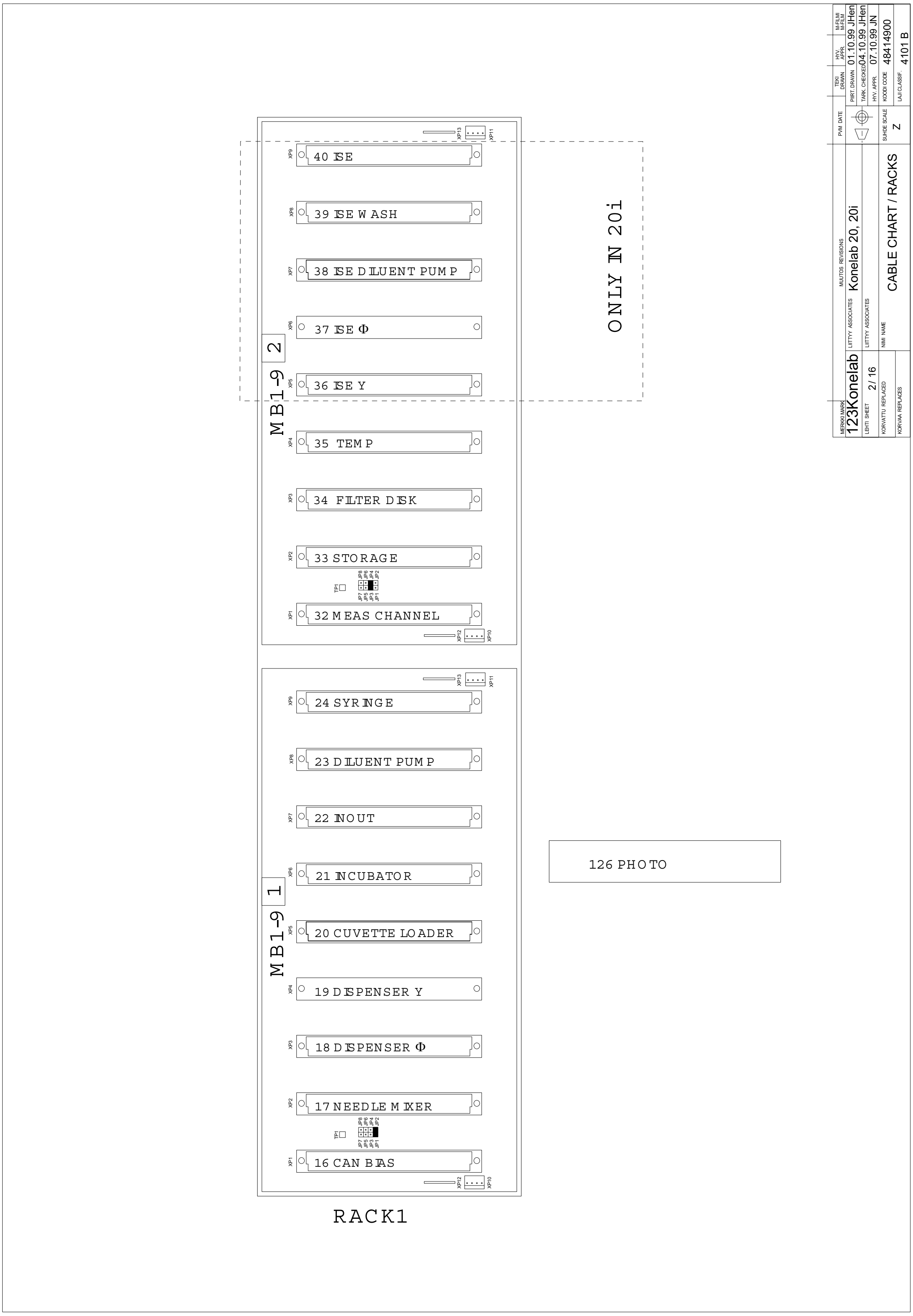


Figure 3-102 Racks (Konelab 20, 20i)

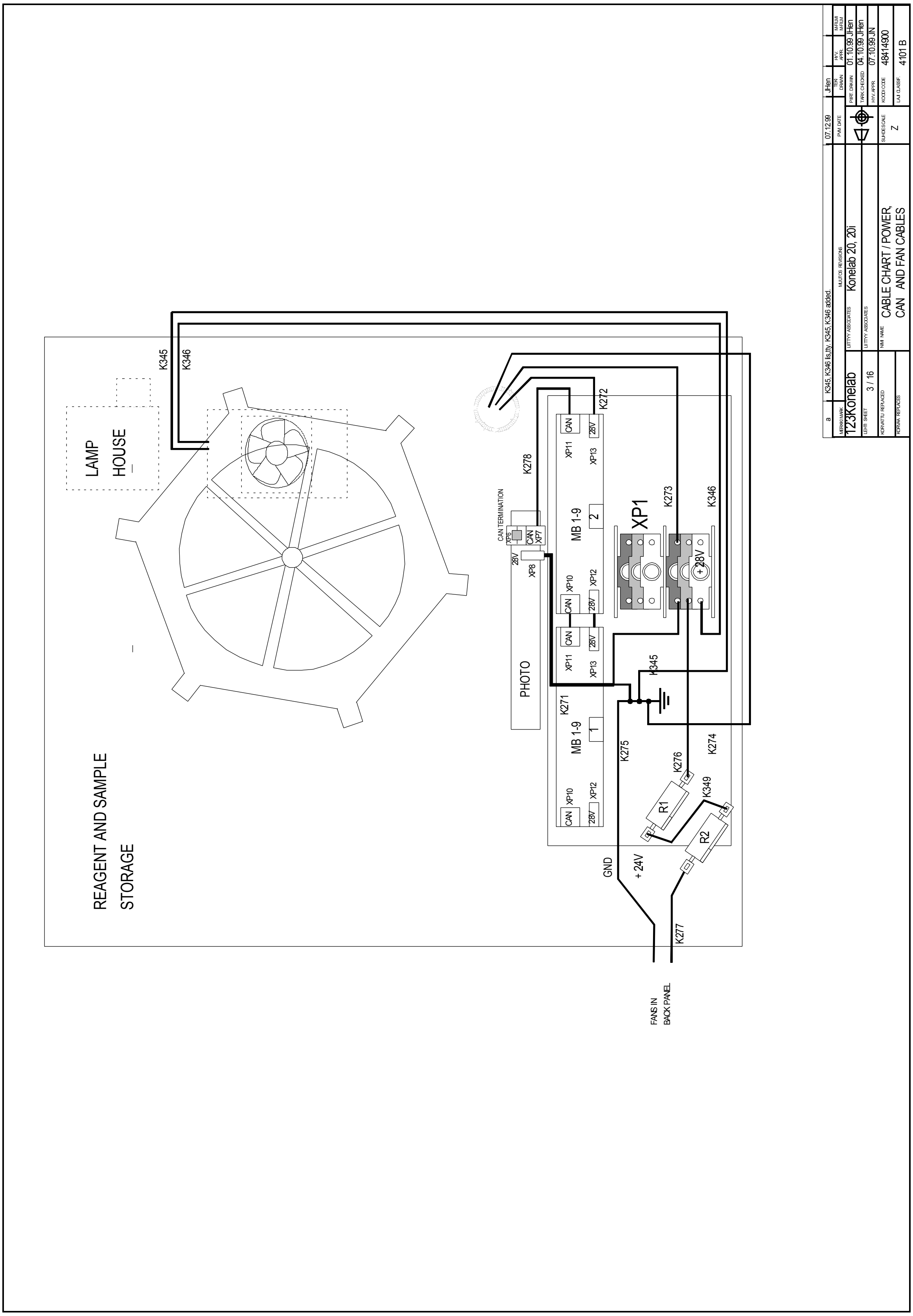


Figure 3-103 Power, can and fan cables (Konelab 20, 20i)

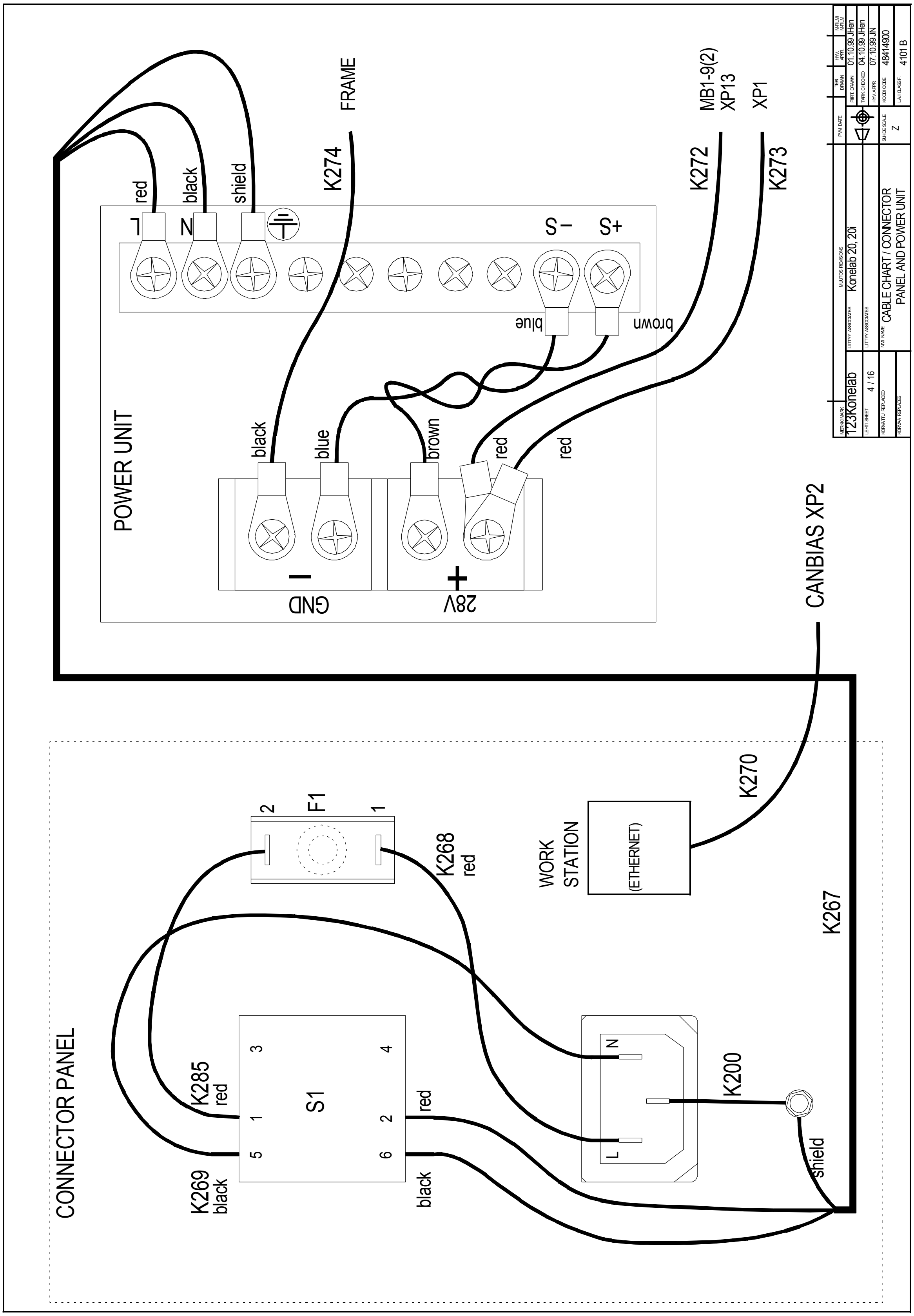


Figure 3-104 Connector panel power unit (Konelab 20, 20i)

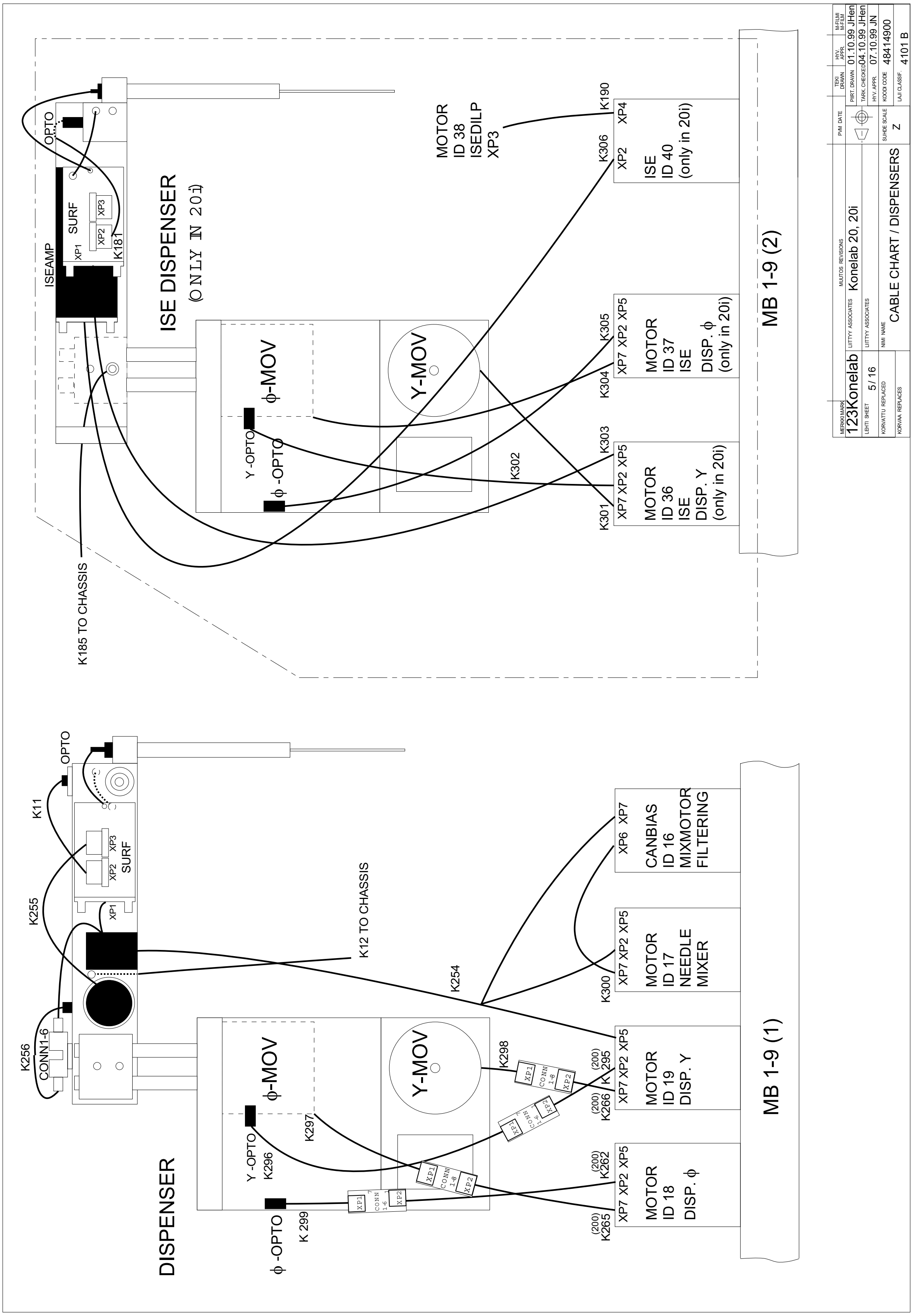


Figure 3-105 Dispensers (Konelab 20, 20i)

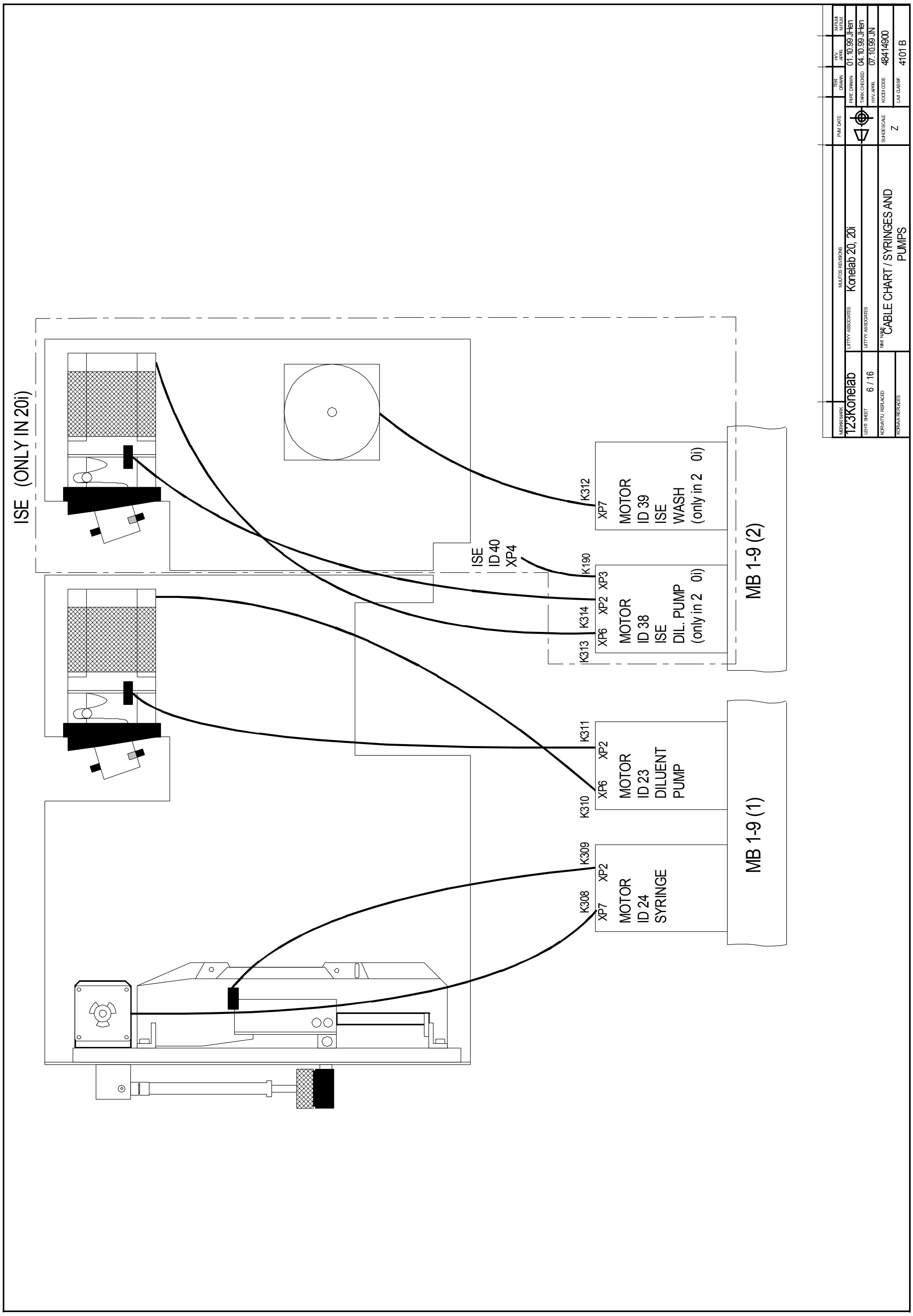


Figure 3-106 Syringes and pumps (Konelab 20, 20i)

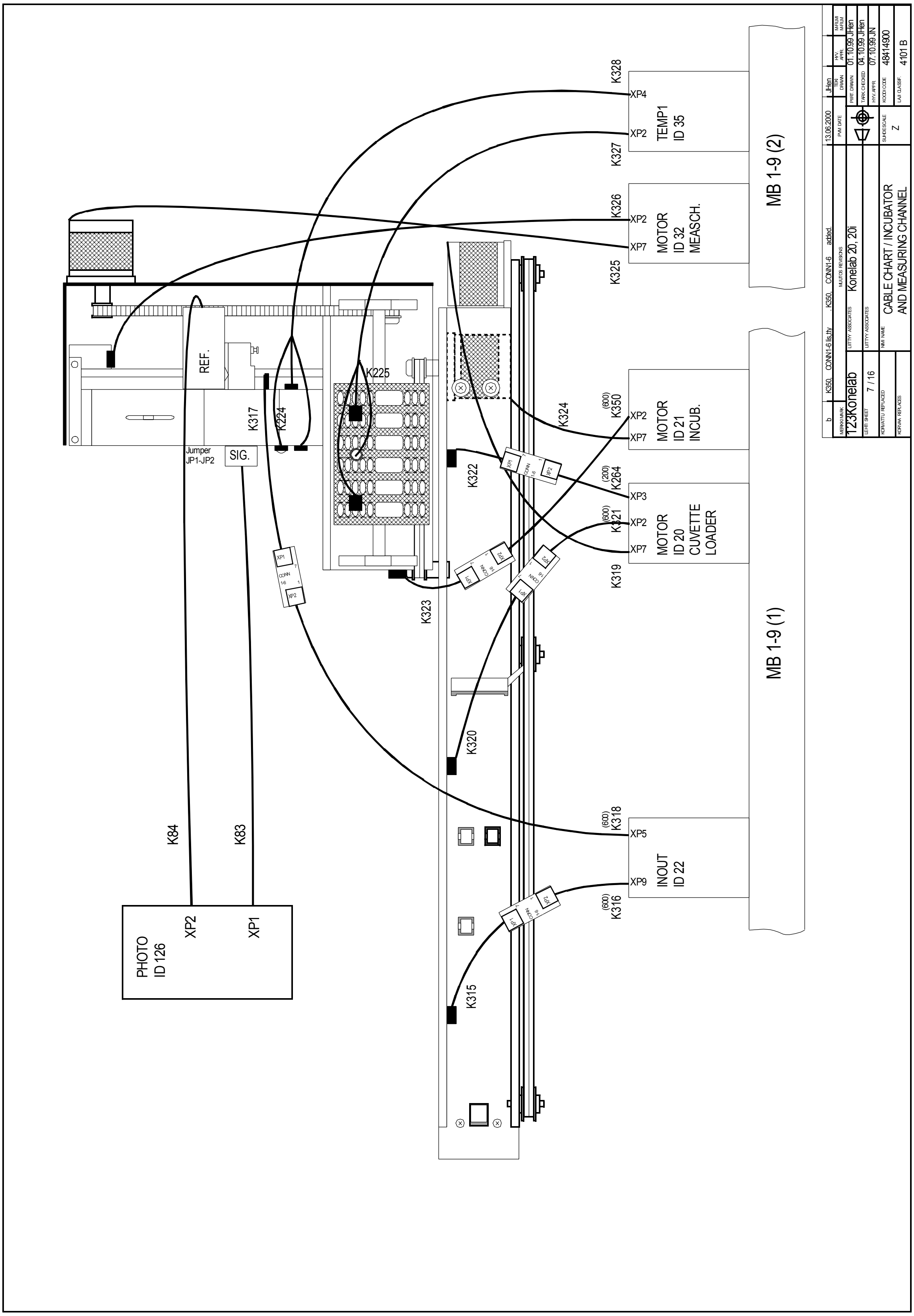


Figure 3-107 Incubator and measuring channel (Konelab 20, 20i)

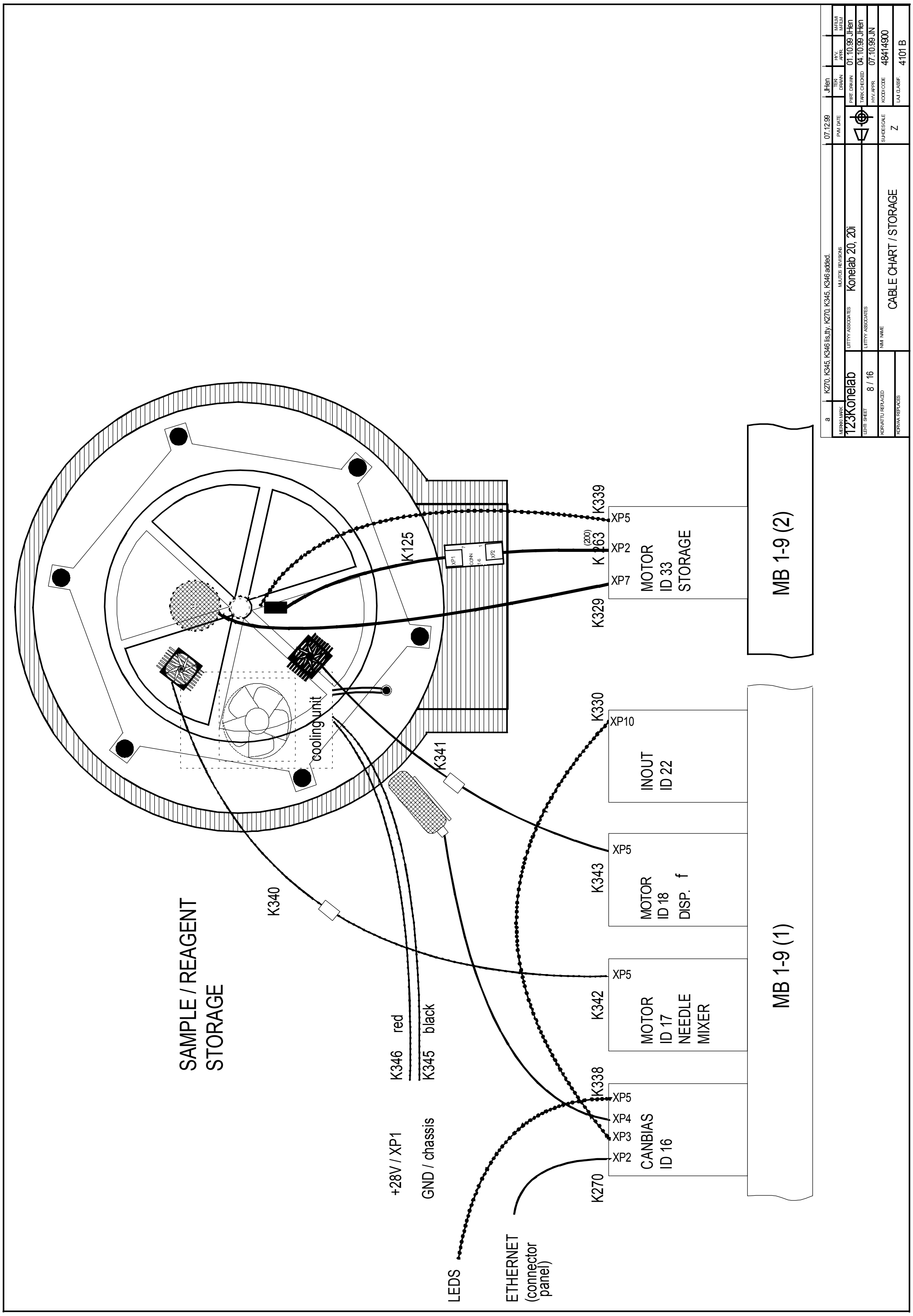


Figure 3-108 Storages (Konelab 20, 20i)

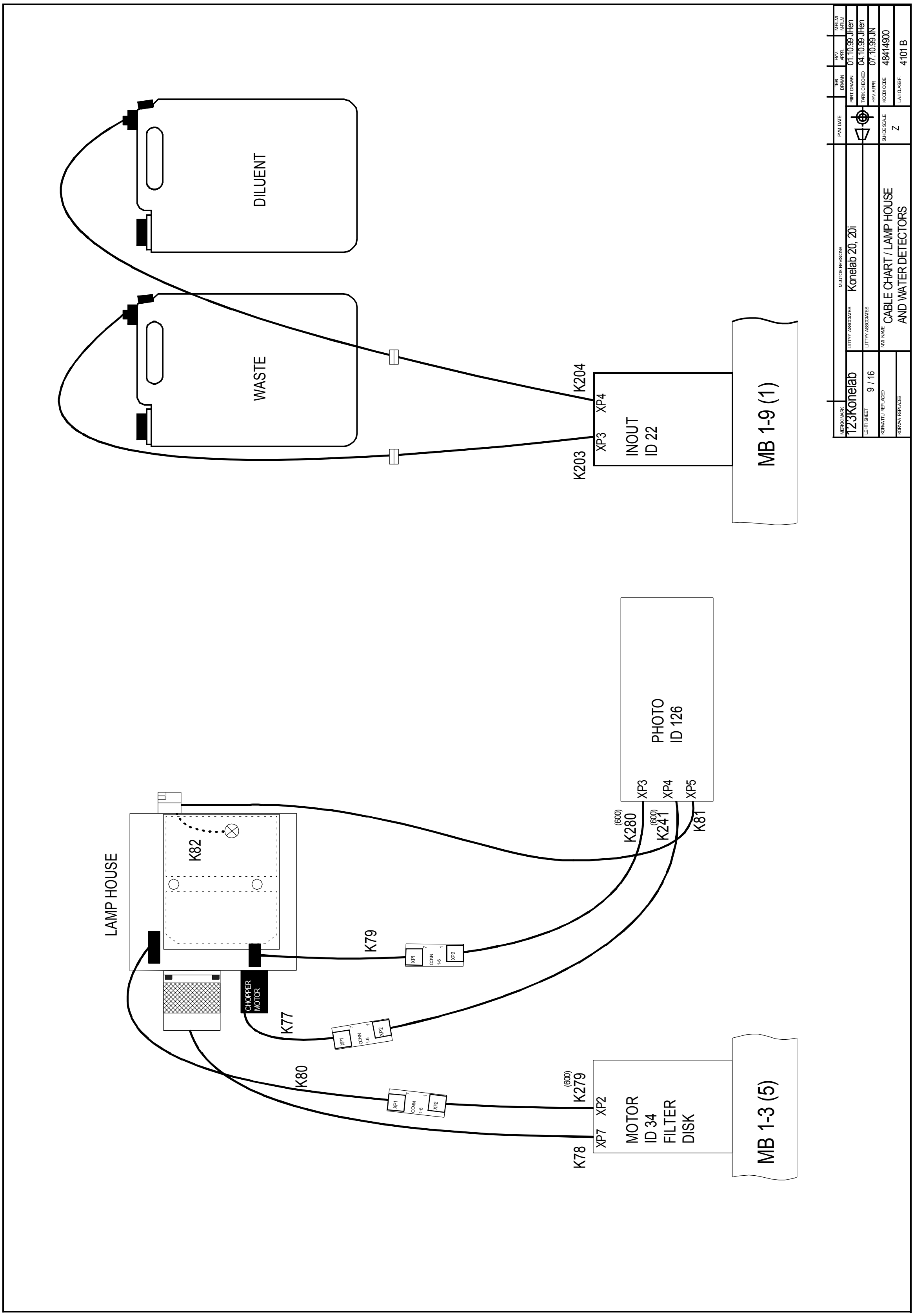


Figure 3-109 Lamp house and water detectors (Konelab 20, 20i)

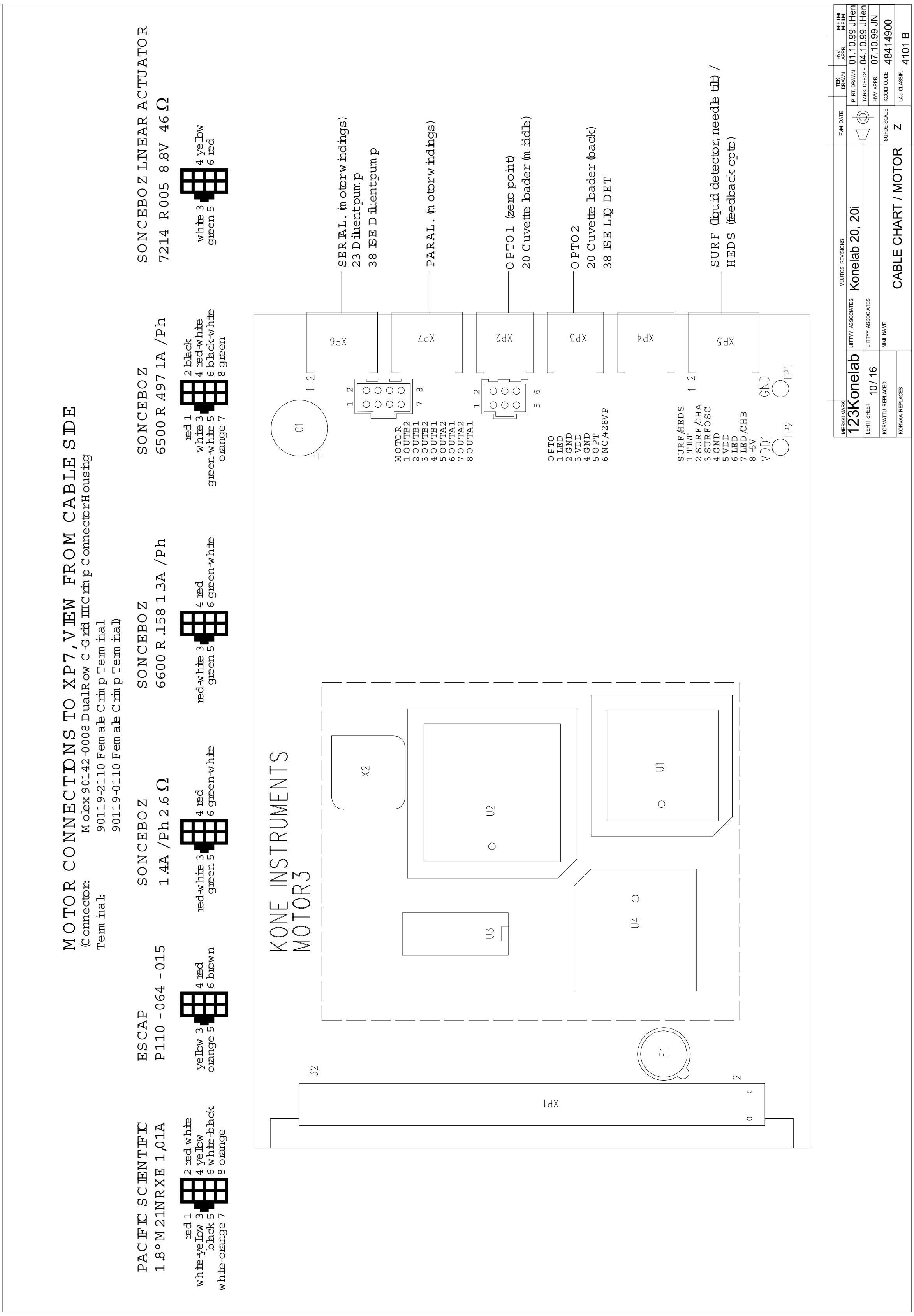


Figure 3-110 Motor (Konelab 20, 20i)

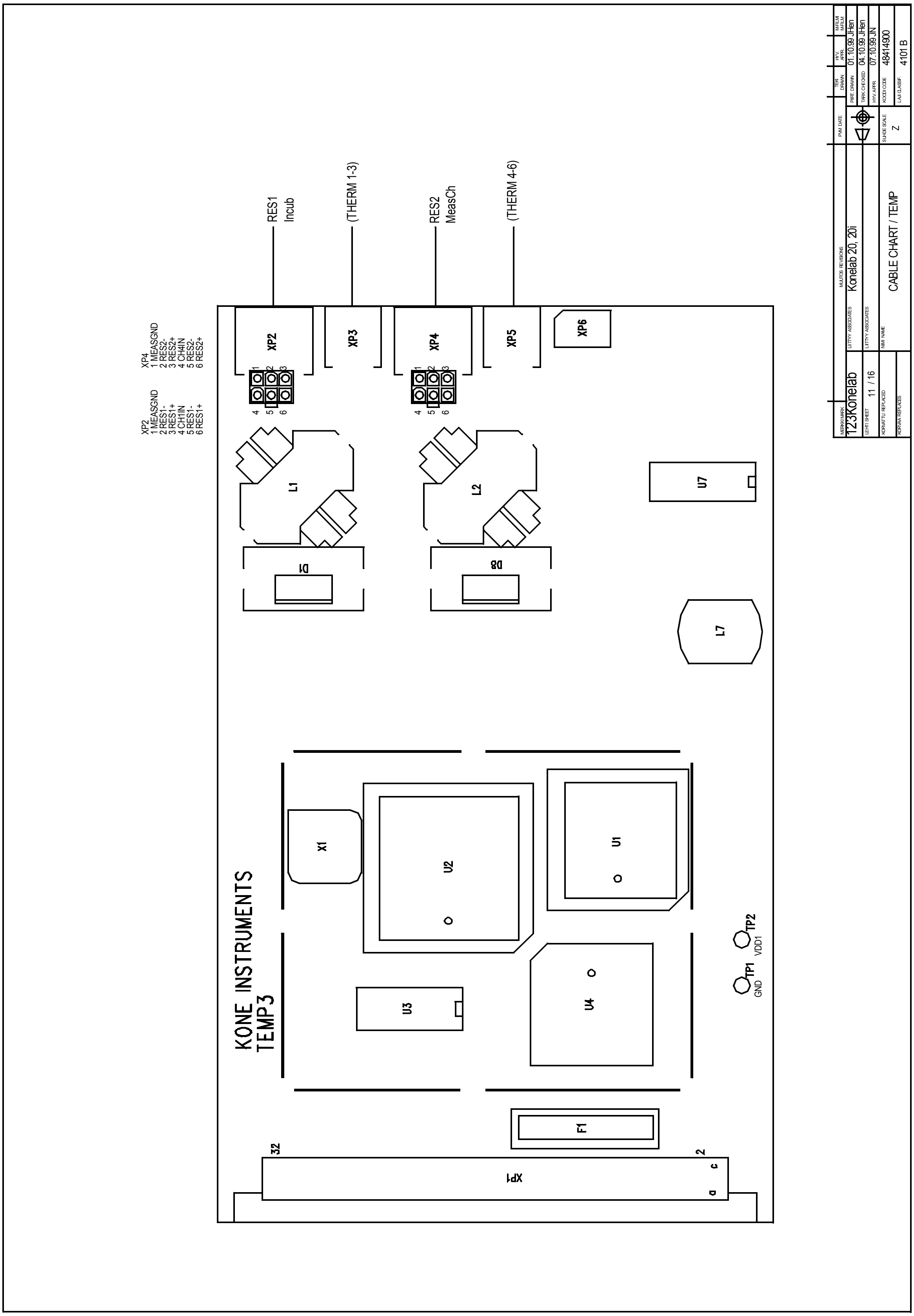


Figure 3-111 Temp (Konelab 20, 20i)

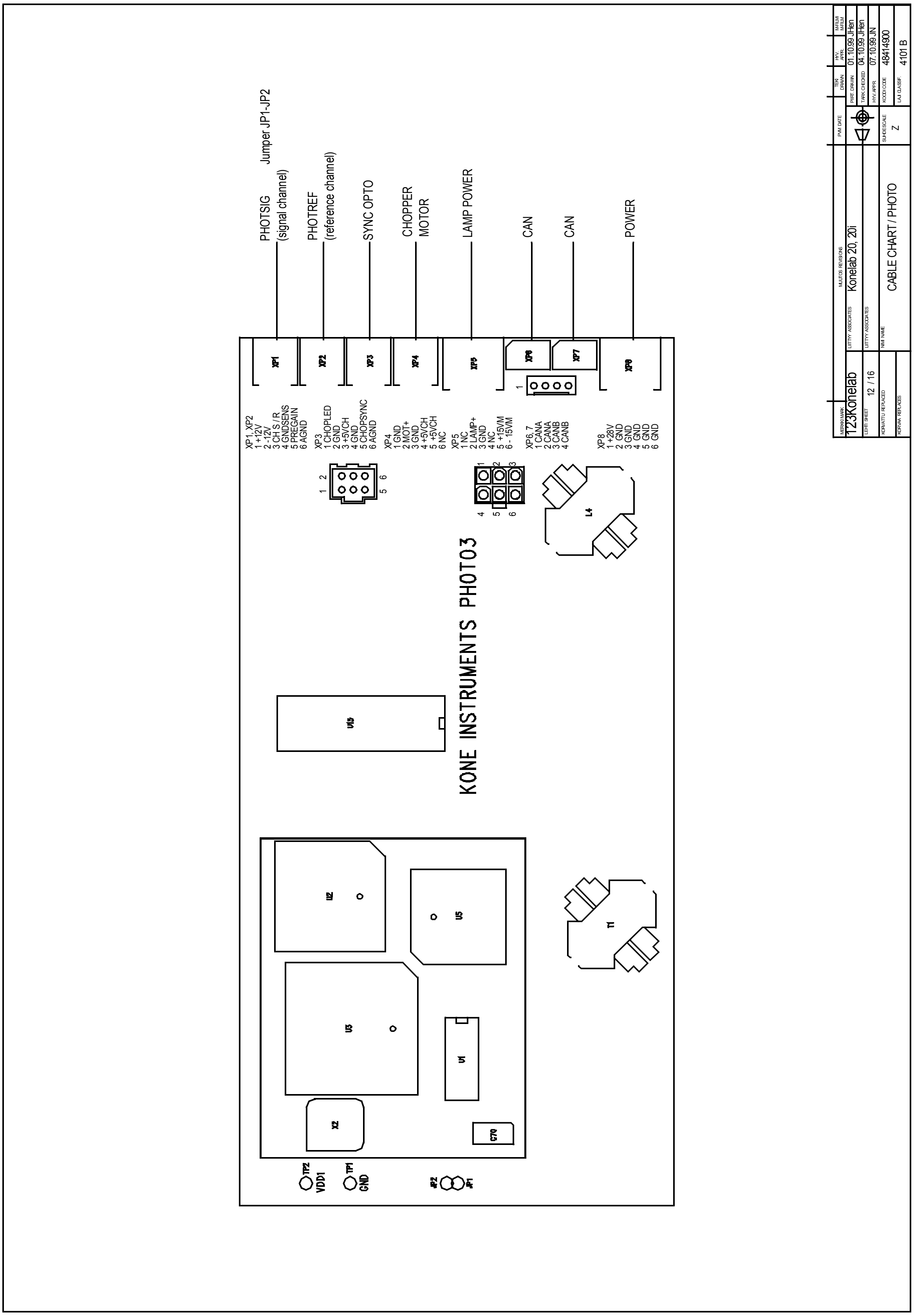


Figure 3-112 Photo (Konelab 20, 20i)

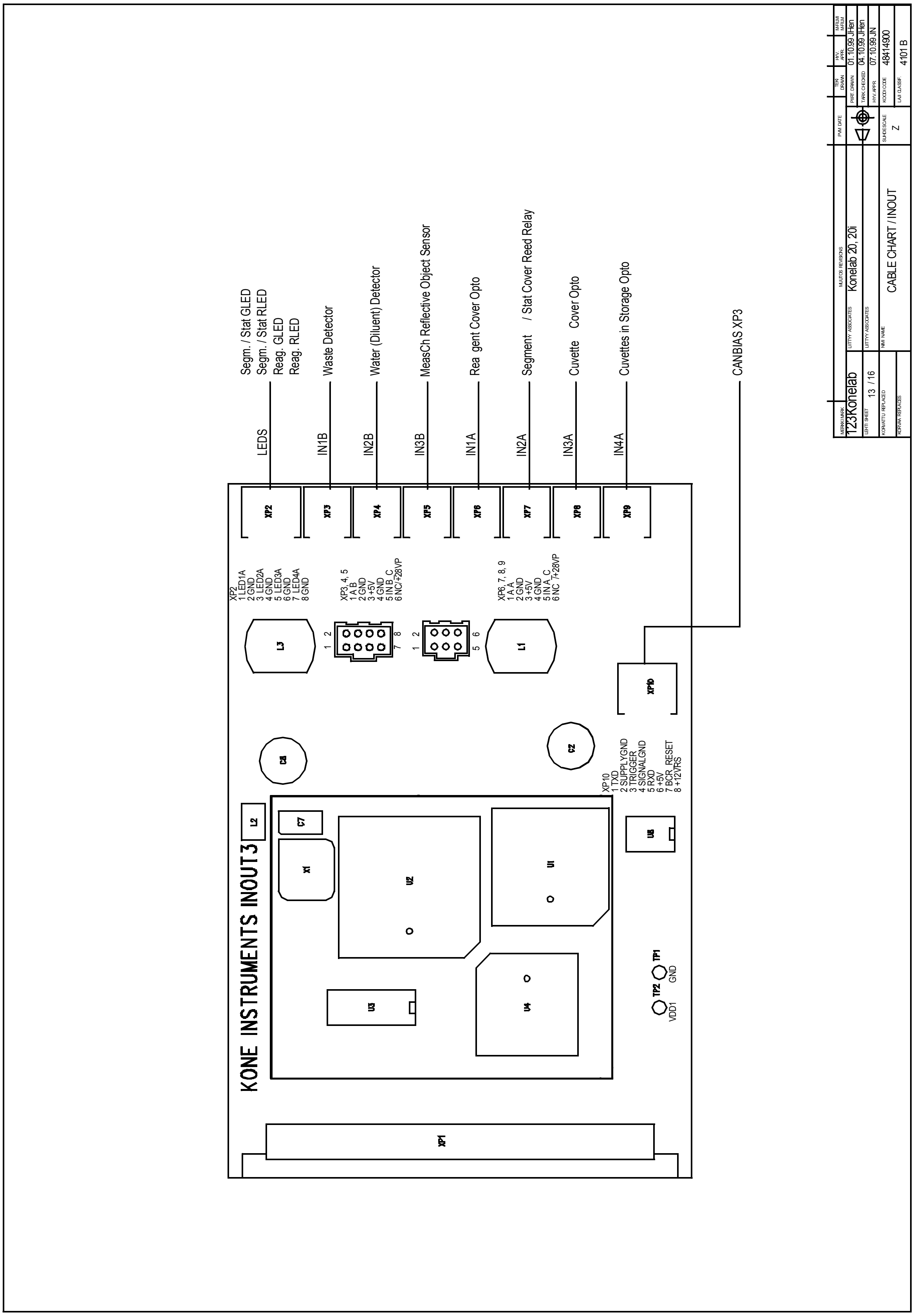


Figure 3-113 INOUT (Konelab 20, 20i)

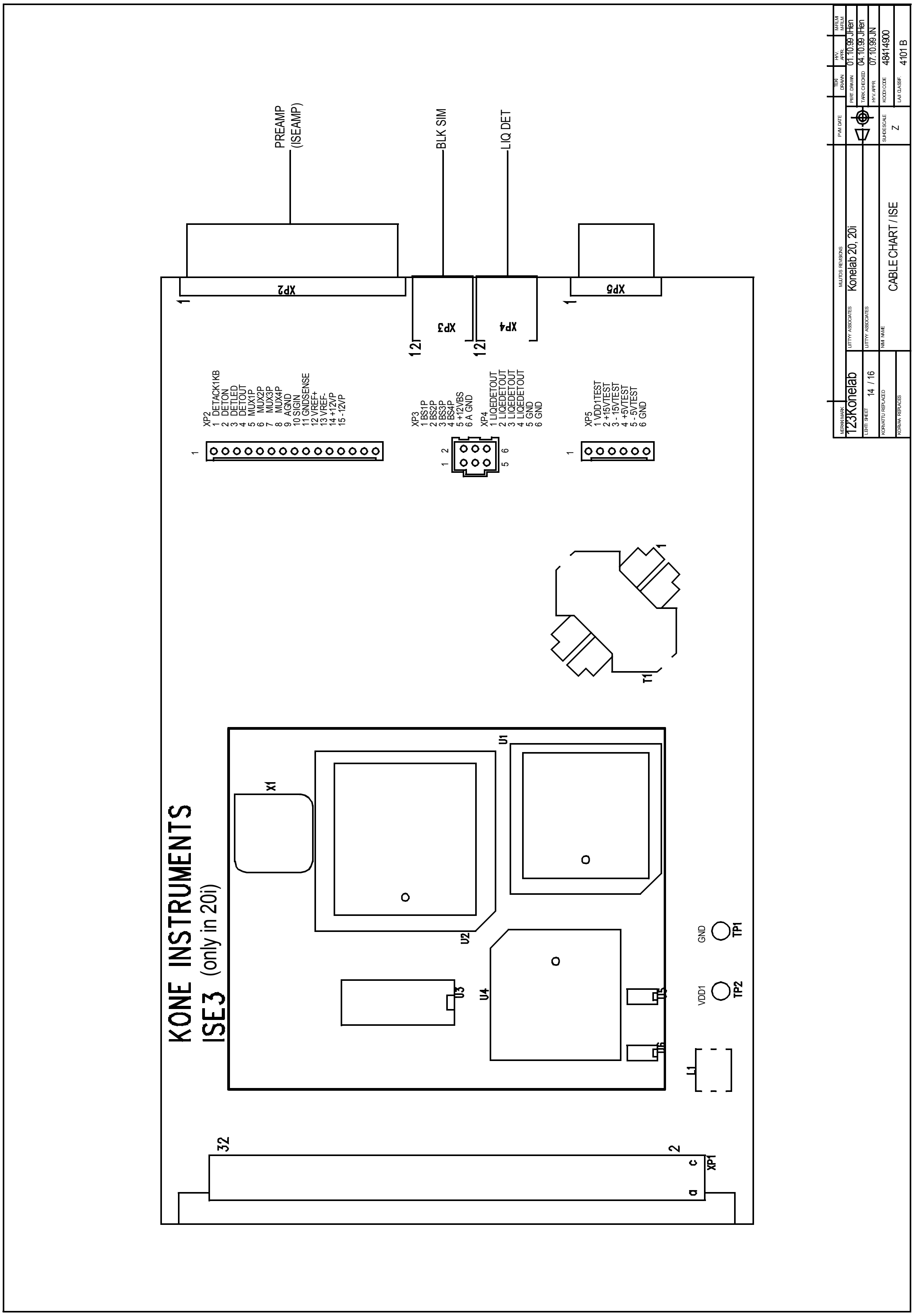


Figure 3-114 ISE (Konelab 20, 20i)

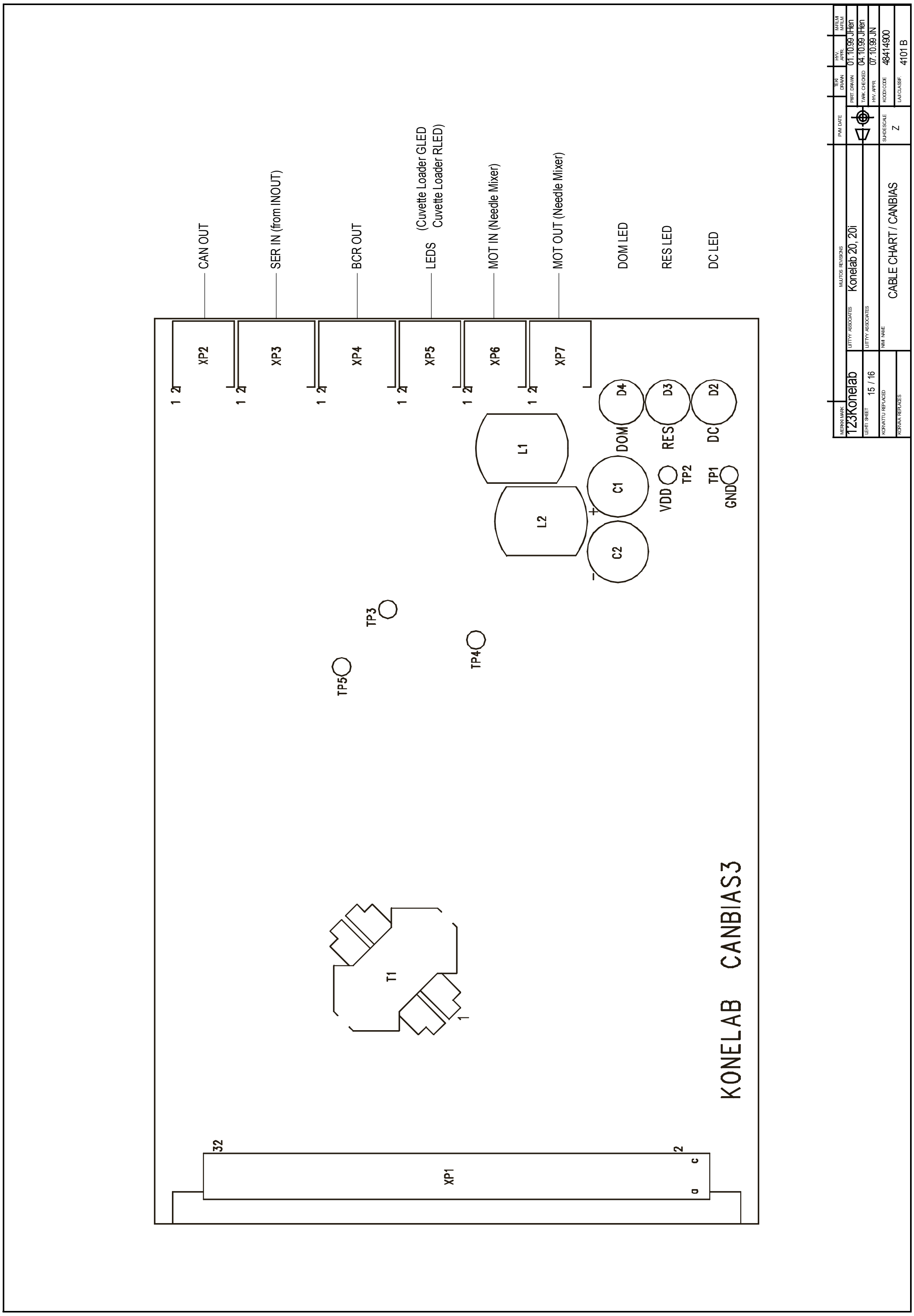


Figure 3-115 CANBIAS (Konelab 20, 20i)

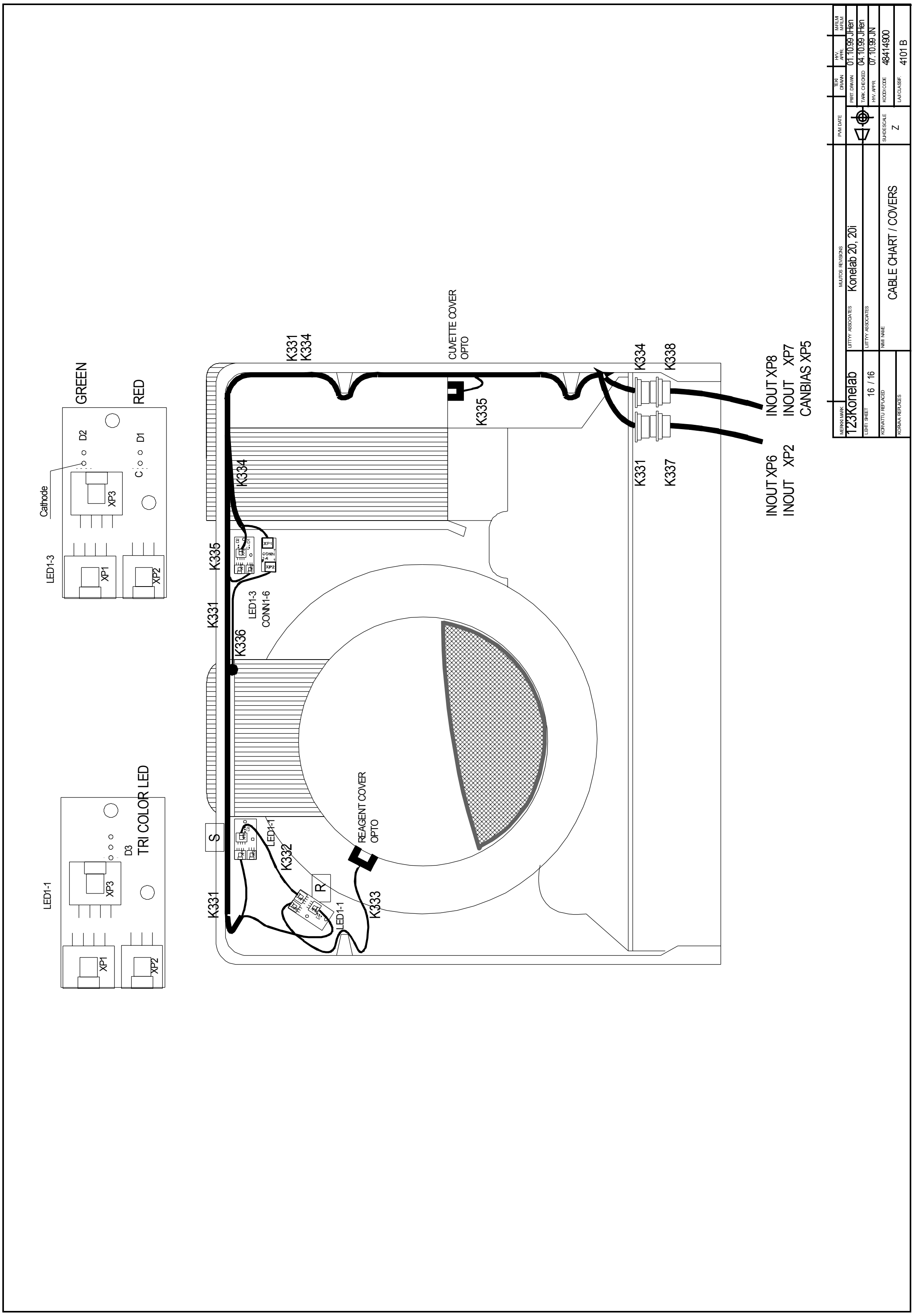


Figure 3-116 Covers (Konelab 20, 20i)

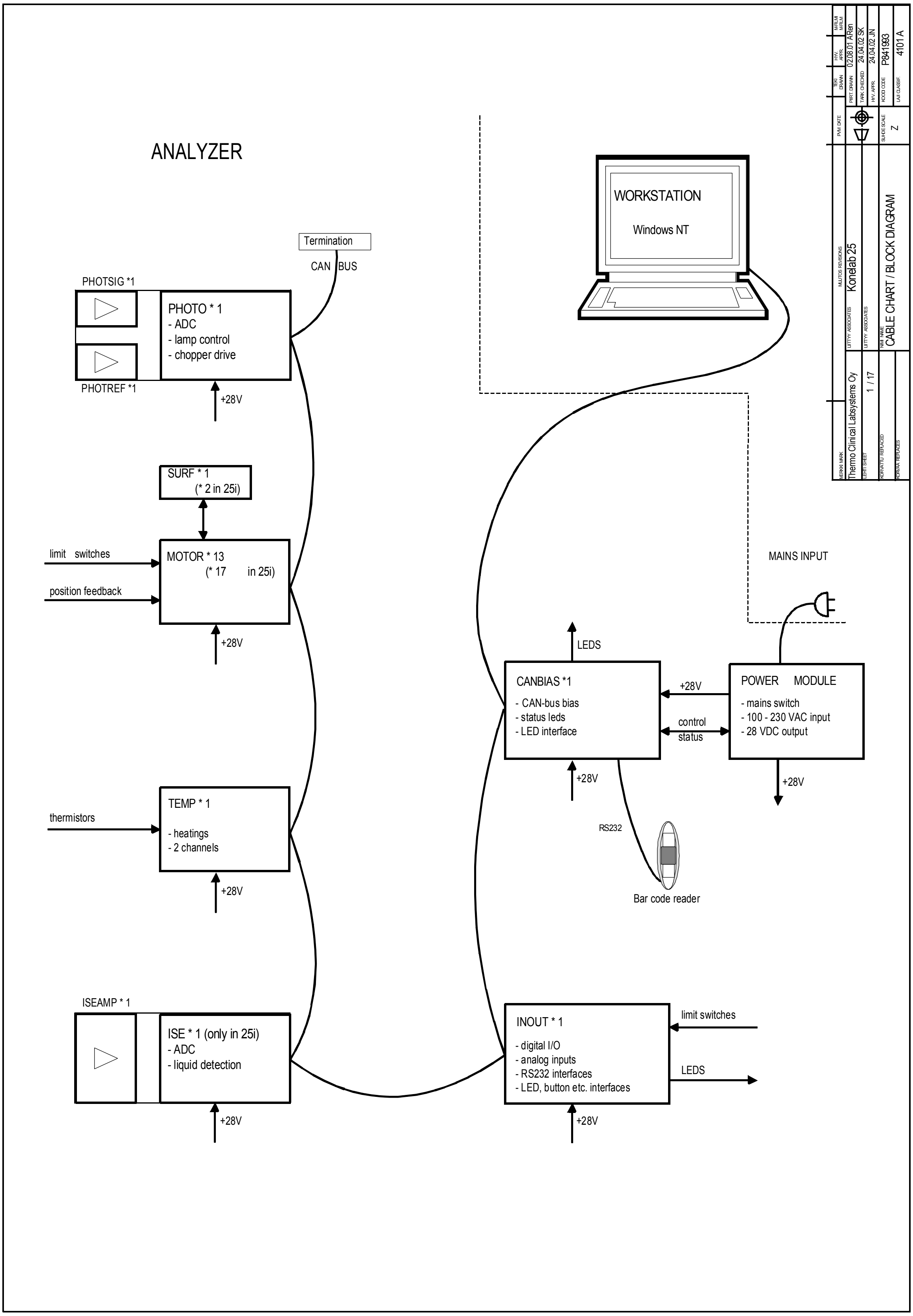


Figure 3-117 Block Diagram (Konelab 20XT, 20XTi)

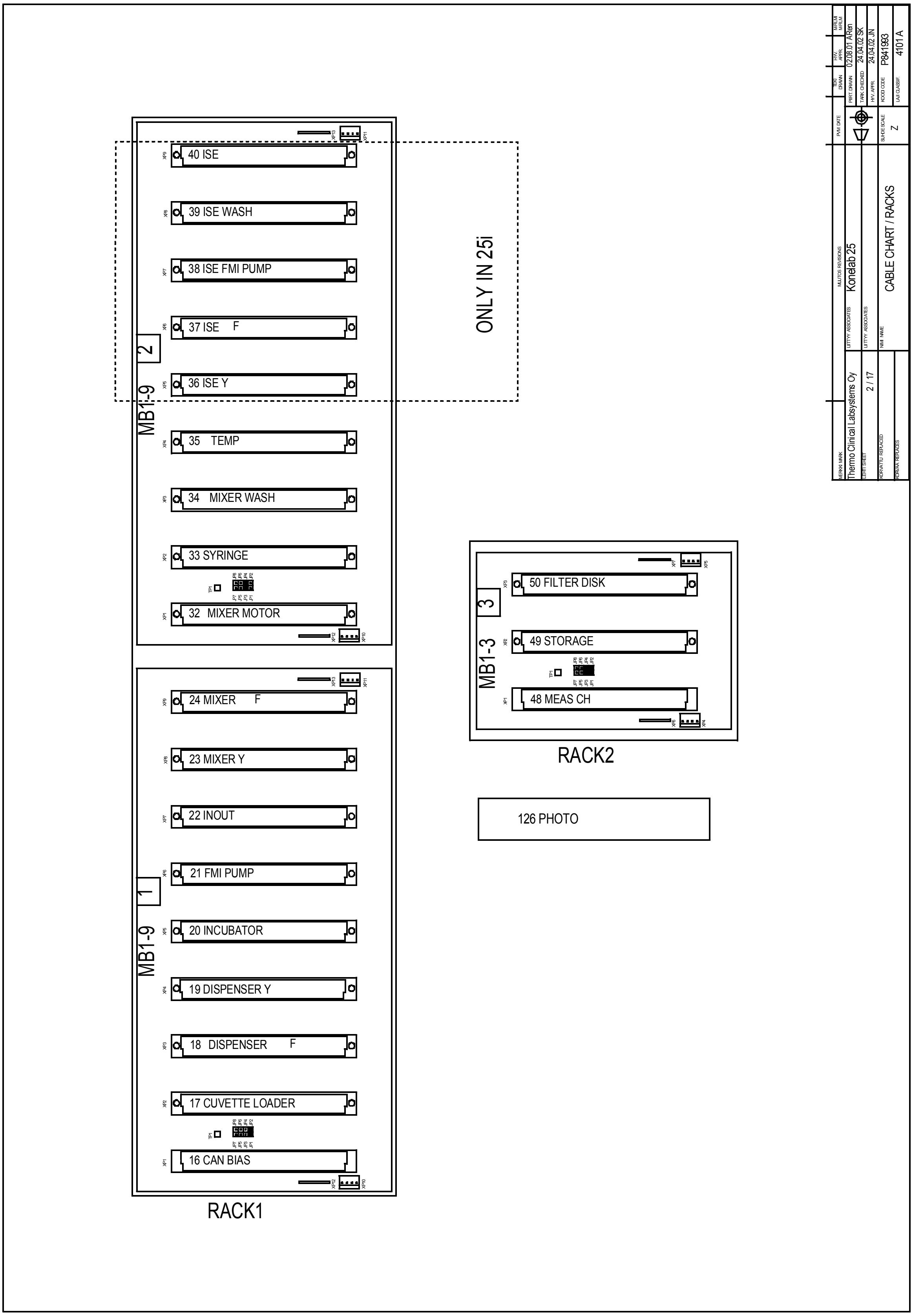


Figure 3-118 Racks (Konelab 20XT, 20XTi)

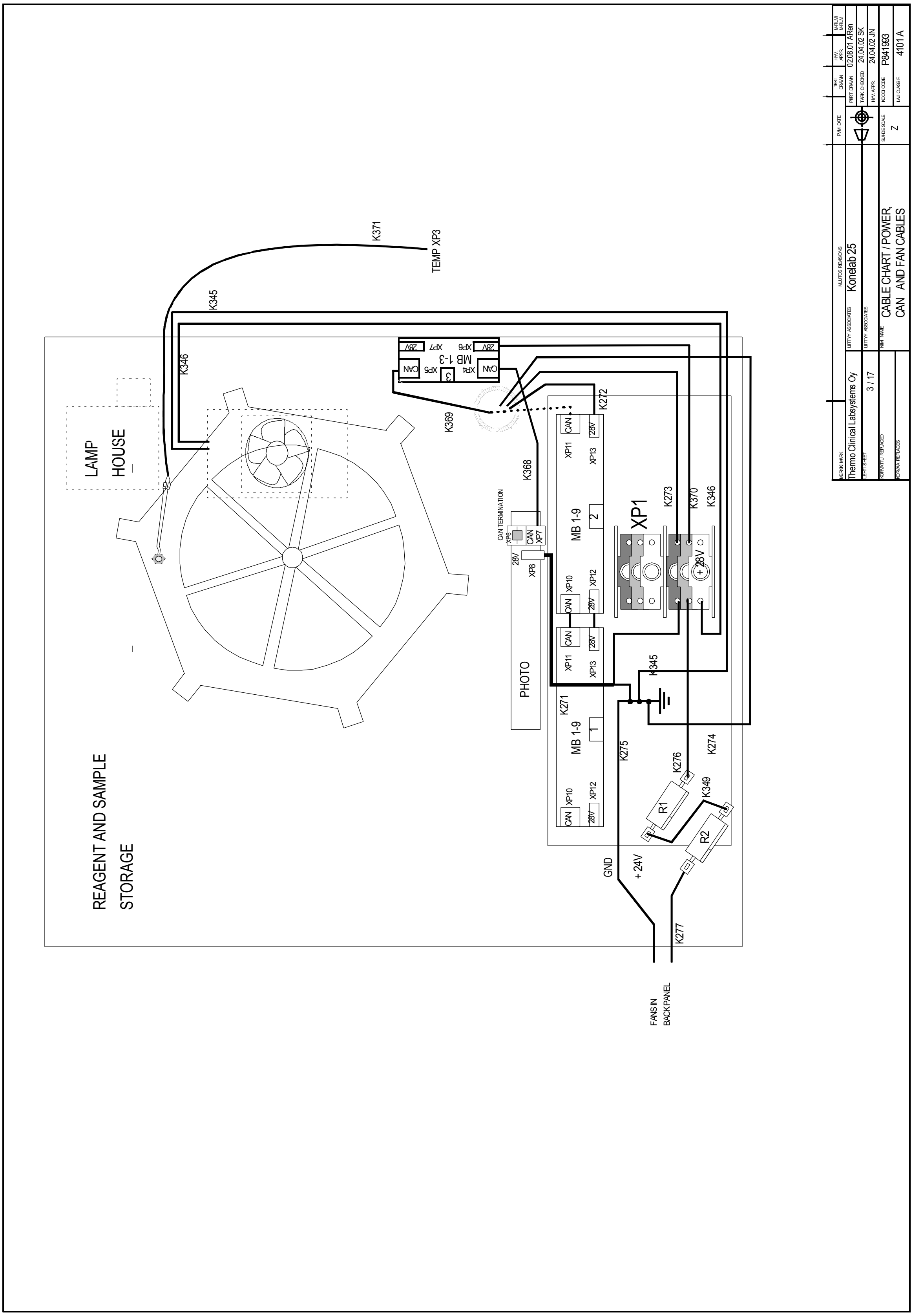


Figure 3-119 Power, can and fan cables (Konelab 20XT, 20XTi)

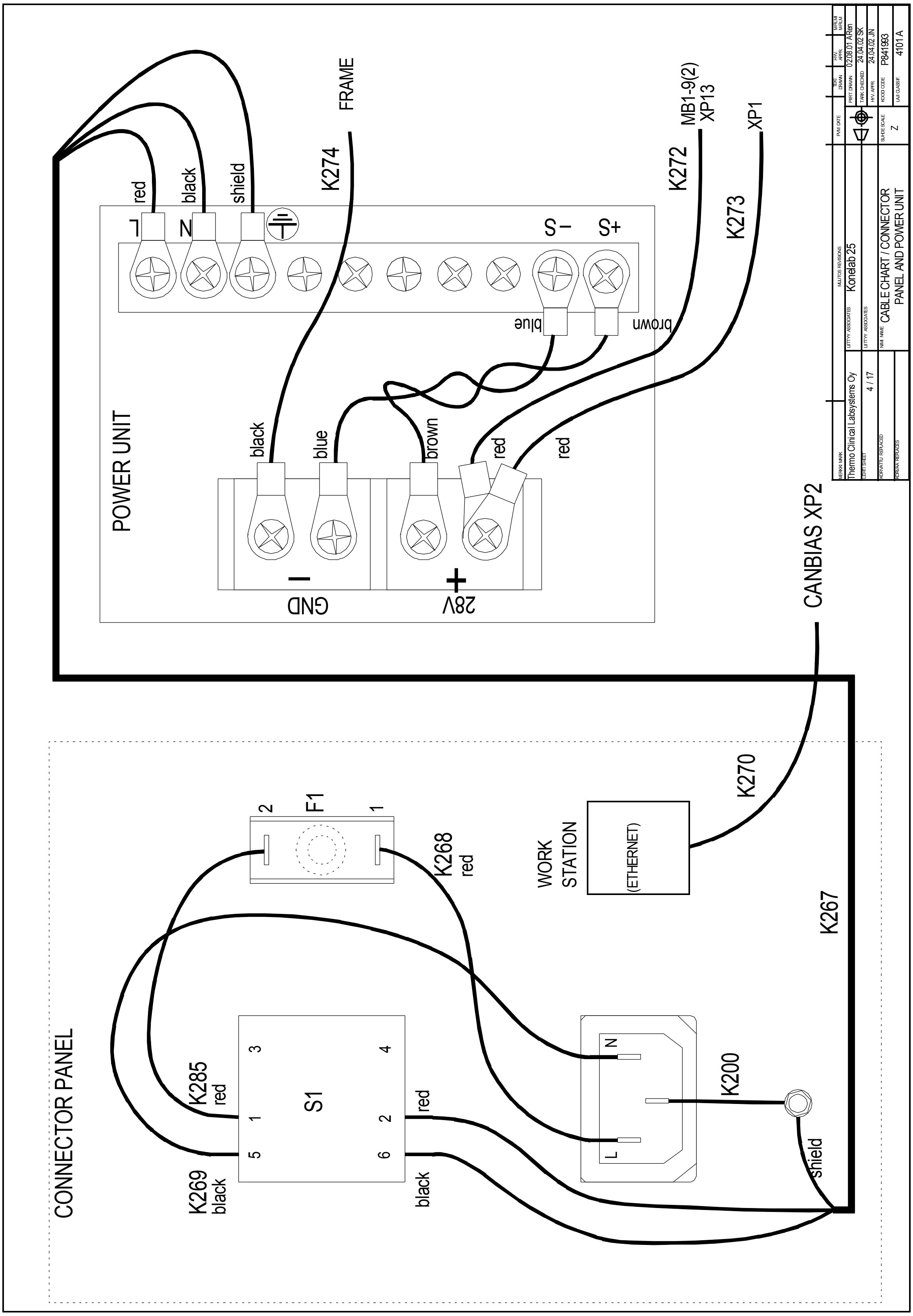


Figure 3-120 Connector panel power unit (Konelab 20XT, 20XTi)

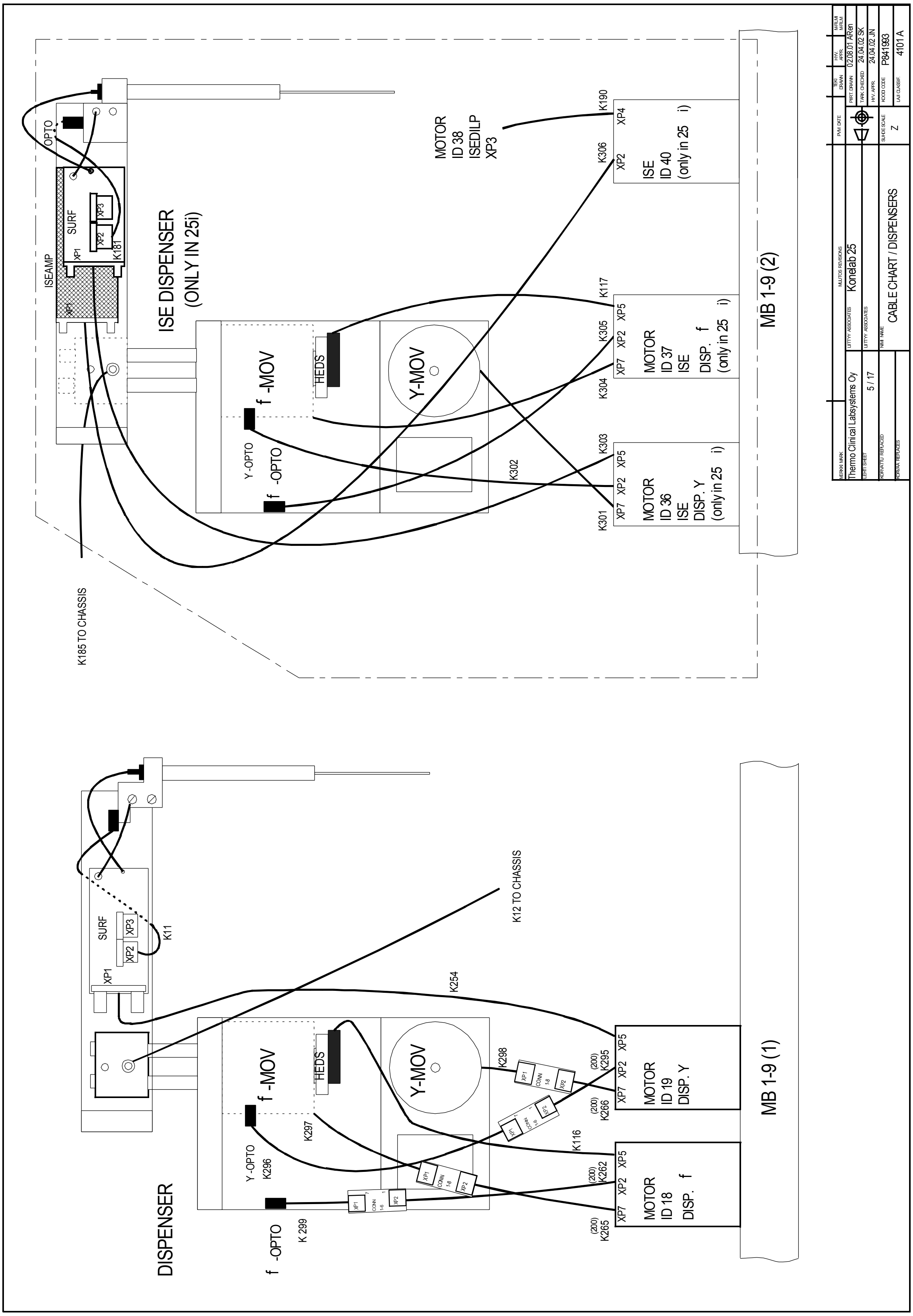


Figure 3-121 Dispensers (Konelab 20XT, 20XTi)

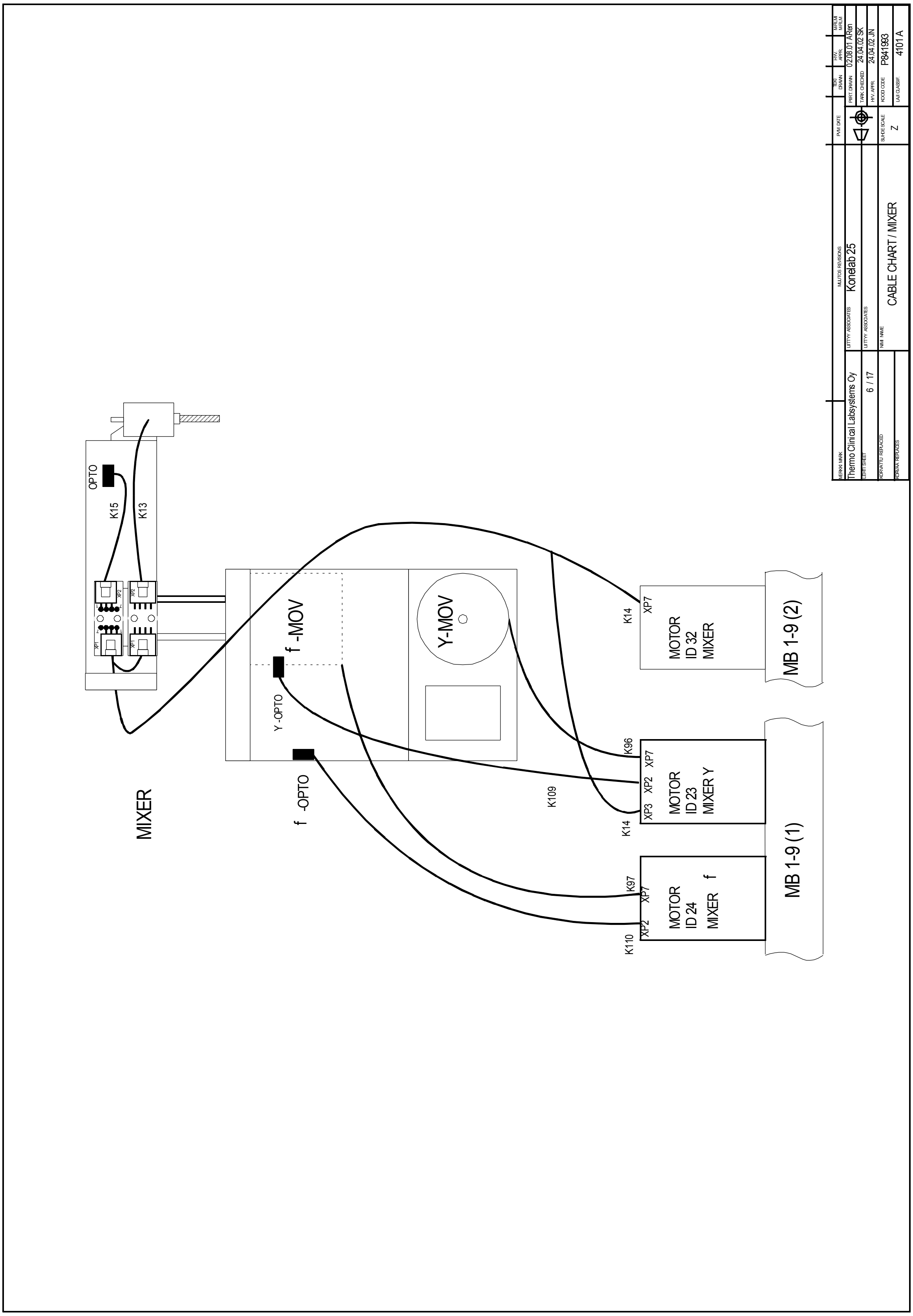


Figure 3-122 Mixer

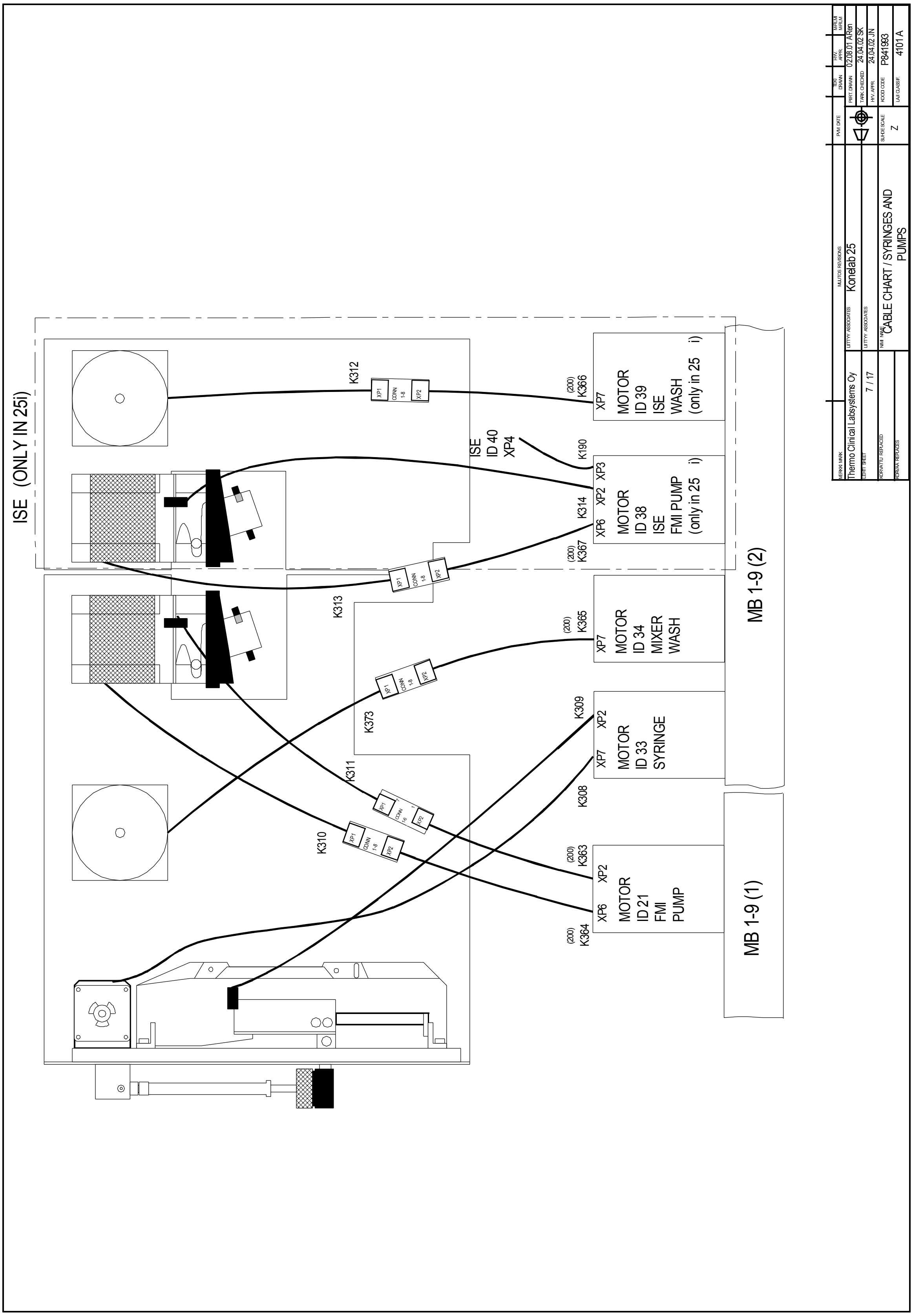


Figure 3-123 Syringes and pumps (Konelab 20XT, 20XTi)

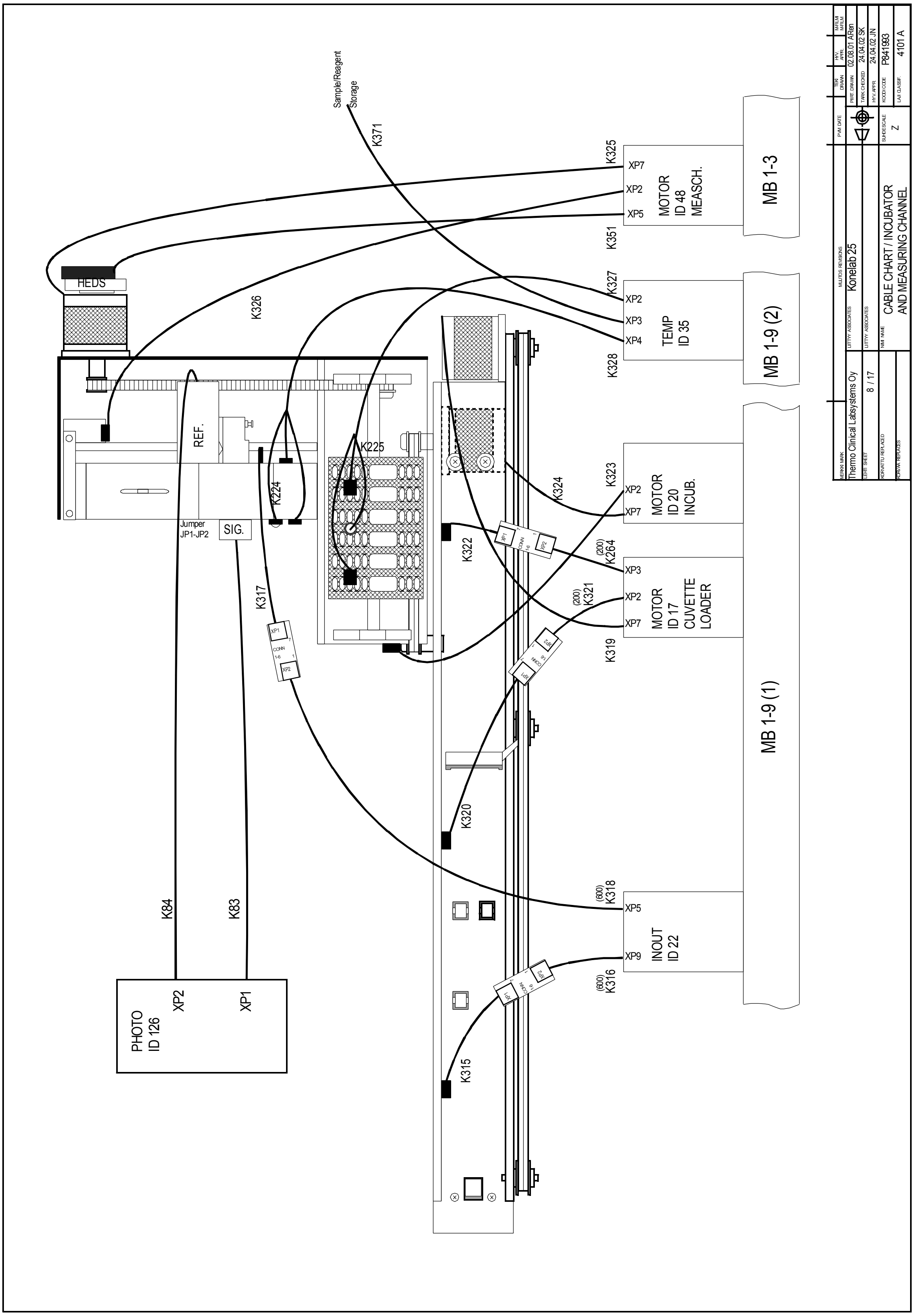


Figure 3-124 Incubator and measuring channel (Konelab 20XT, 20XTi)

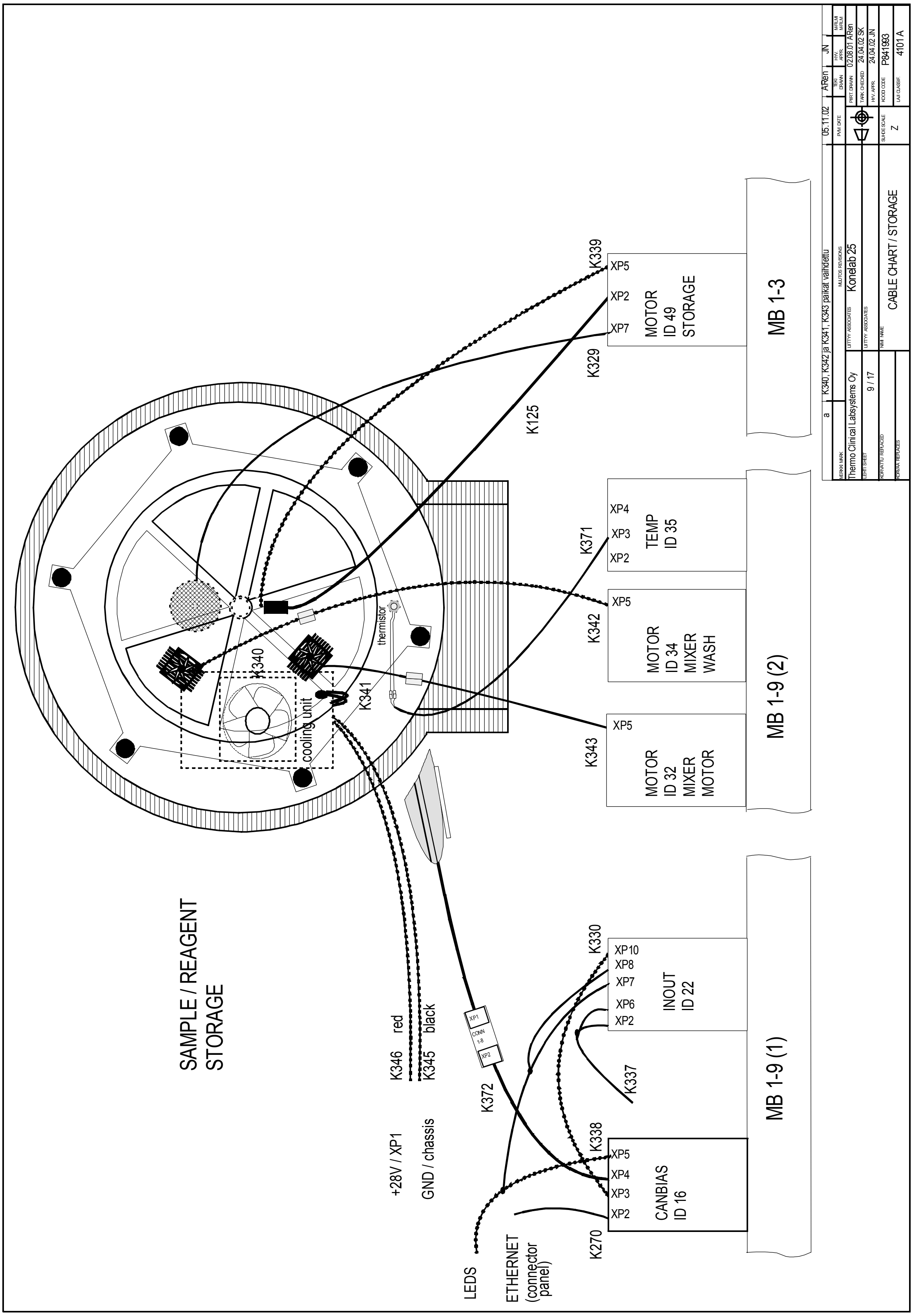


Figure 3-125 Storages (Konelab 20XT, 20XTi)

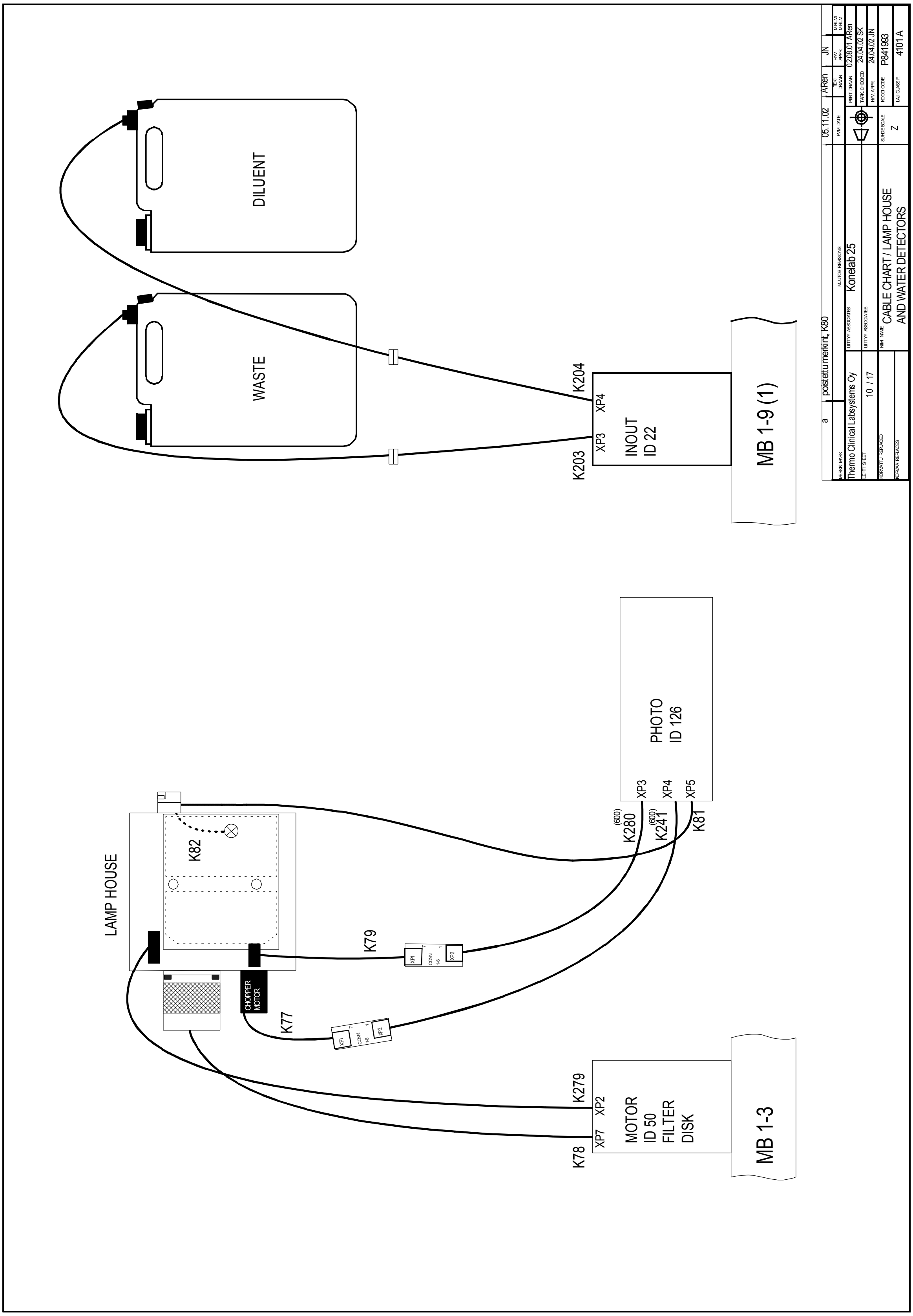


Figure 3-126 Lamp house and water detectors (Konelab 20XT, 20XTi)

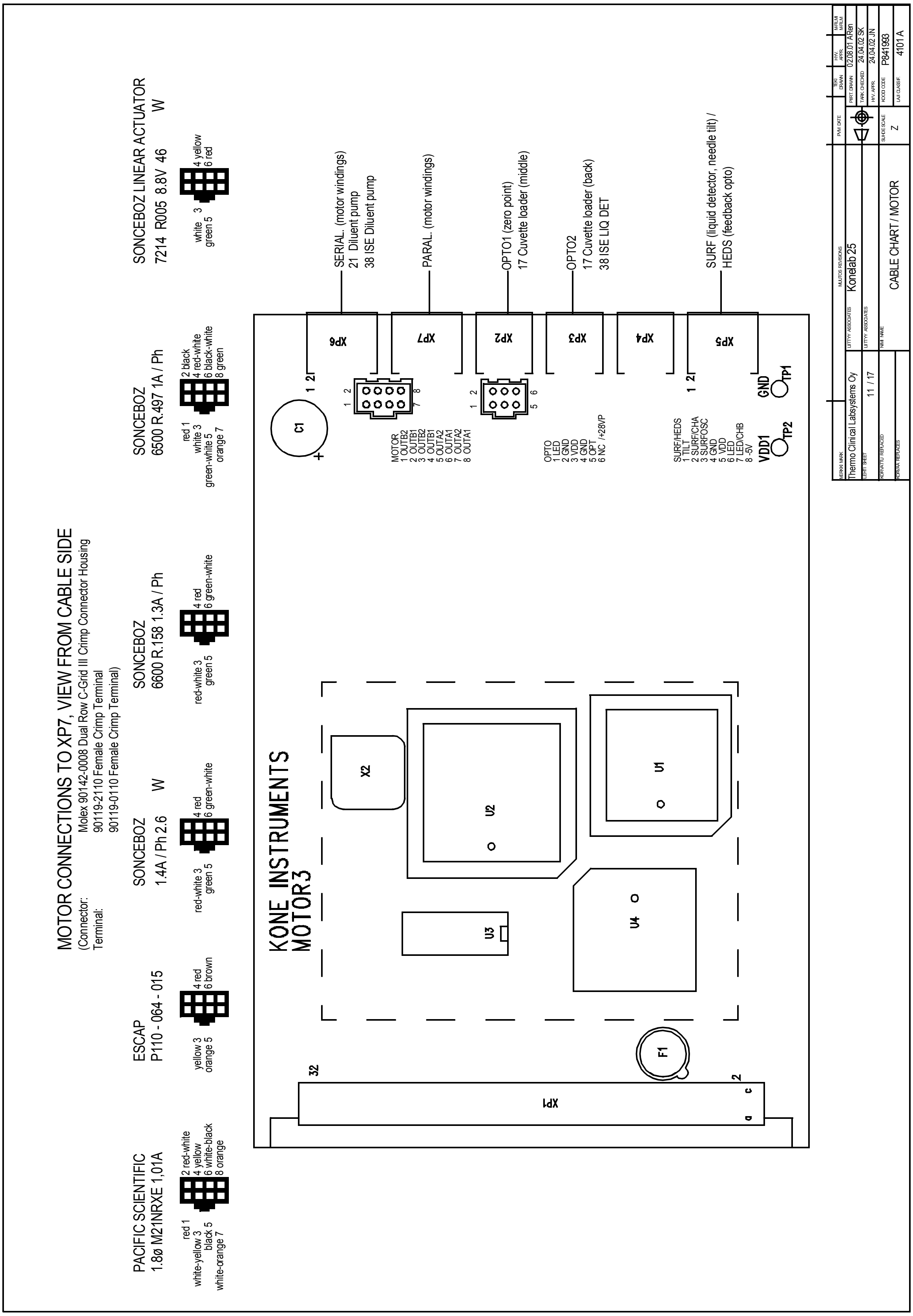


Figure 3-127 Motor (Konelab 20XT, 20XTi)

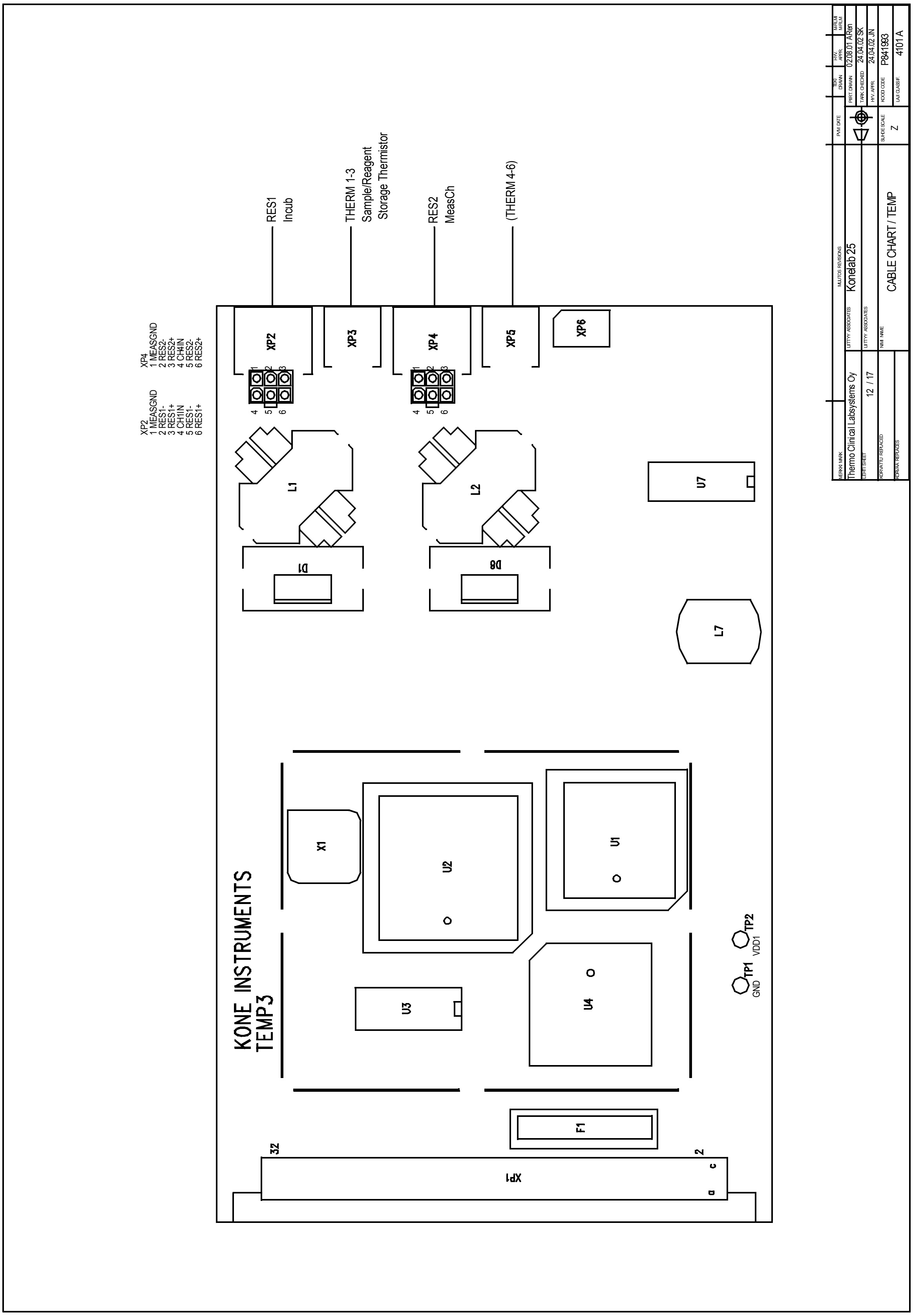


Figure 3-128 Temp (Konelab 20XT, 20XTi)

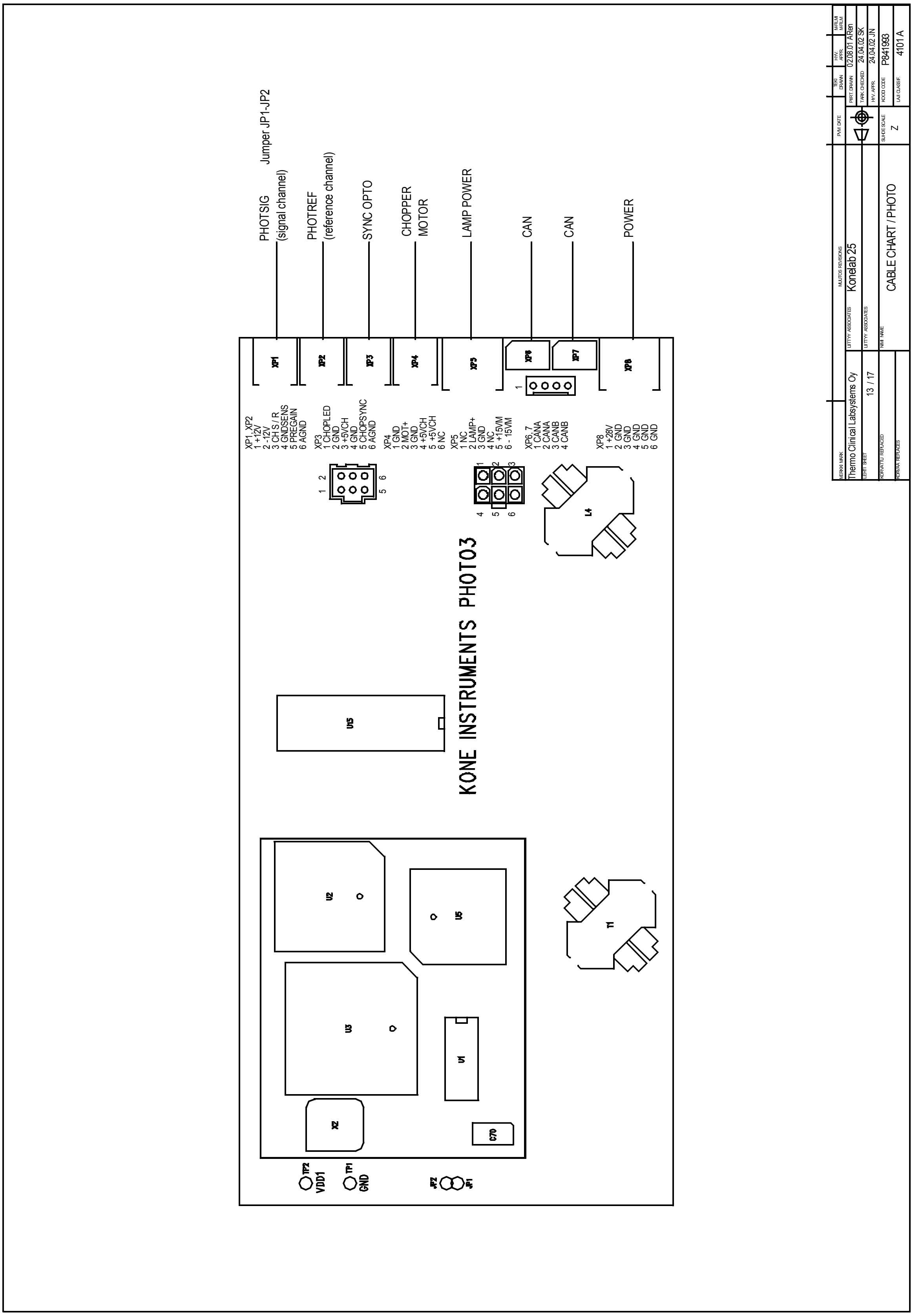


Figure 3-129 Photo (Konelab 20XT, 20XTi)

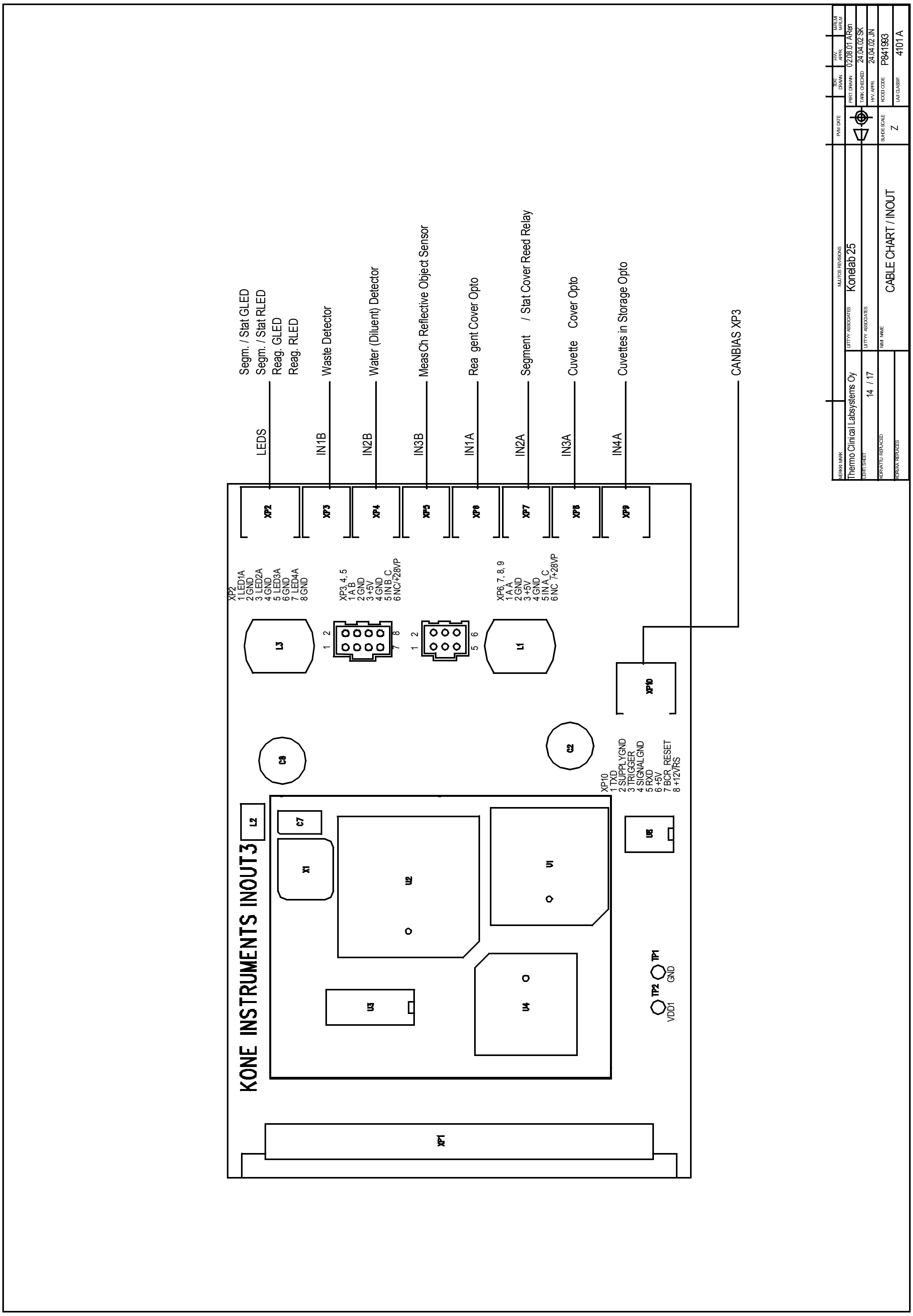


Figure 3-130 INOUT (Konelab 20XT, 20XTi)

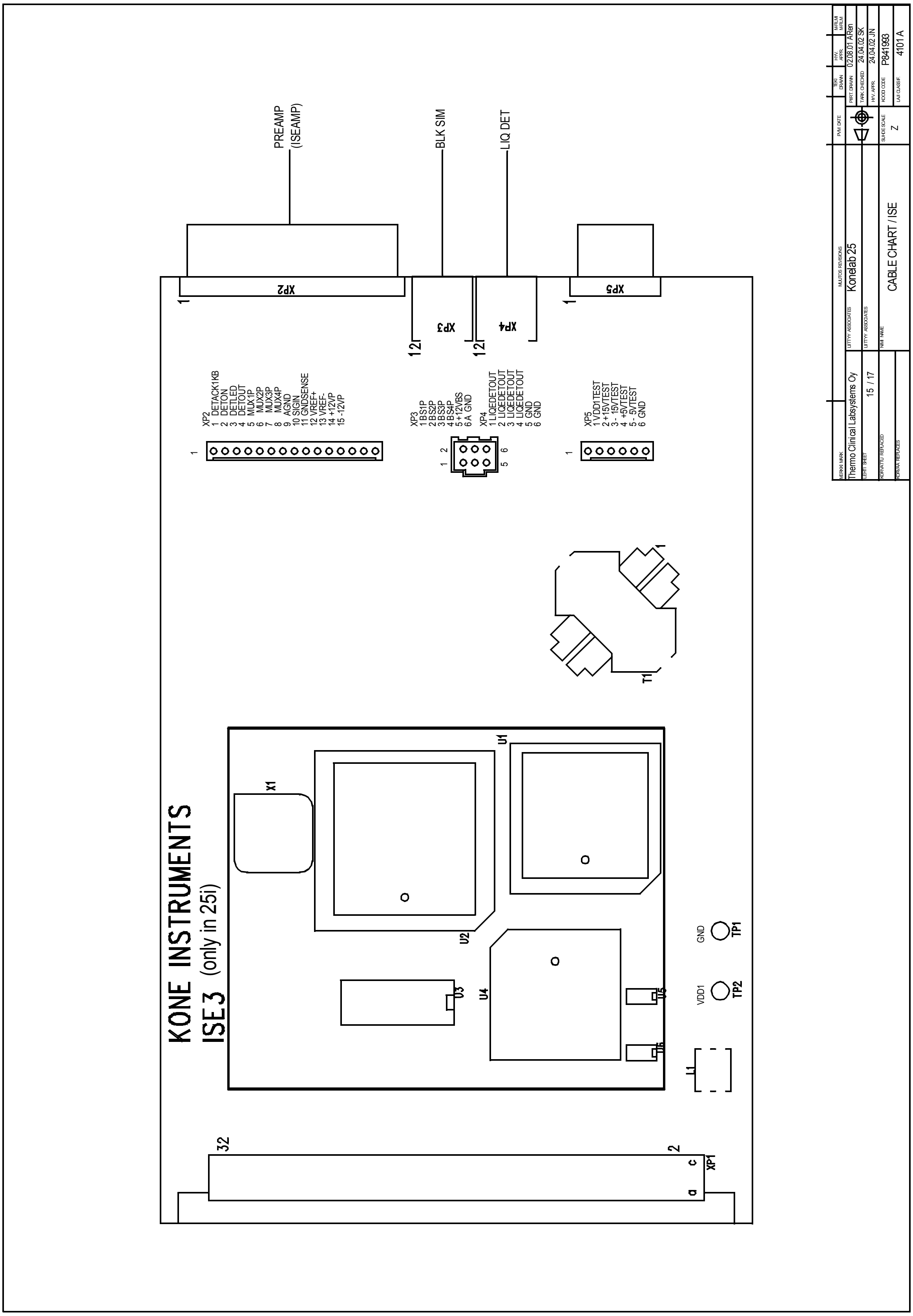


Figure 3-131 ISE (Konelab 20XT, 20XTi)

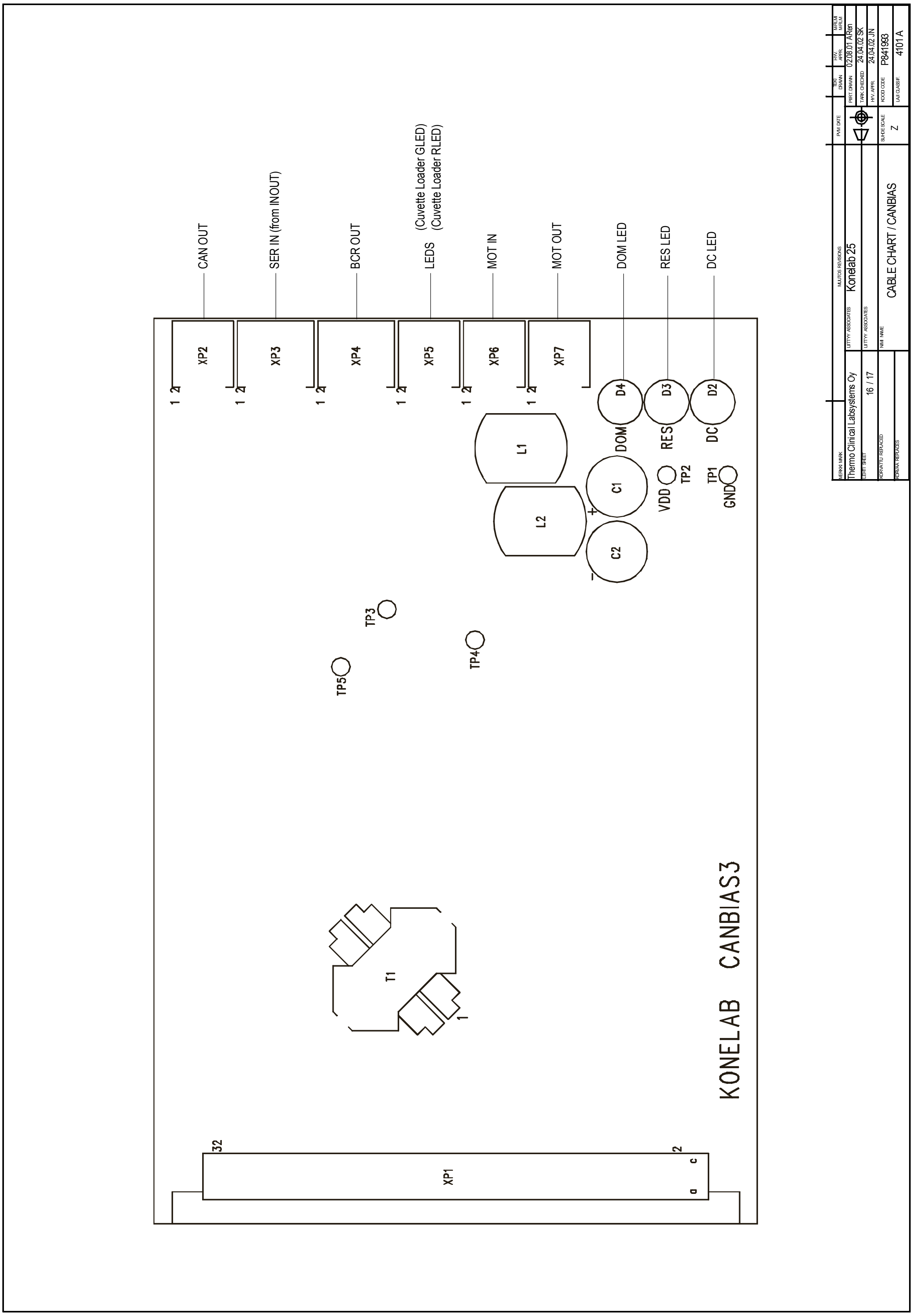


Figure 3-132 CANBIAS (Konelab 20XT, 20XTi)

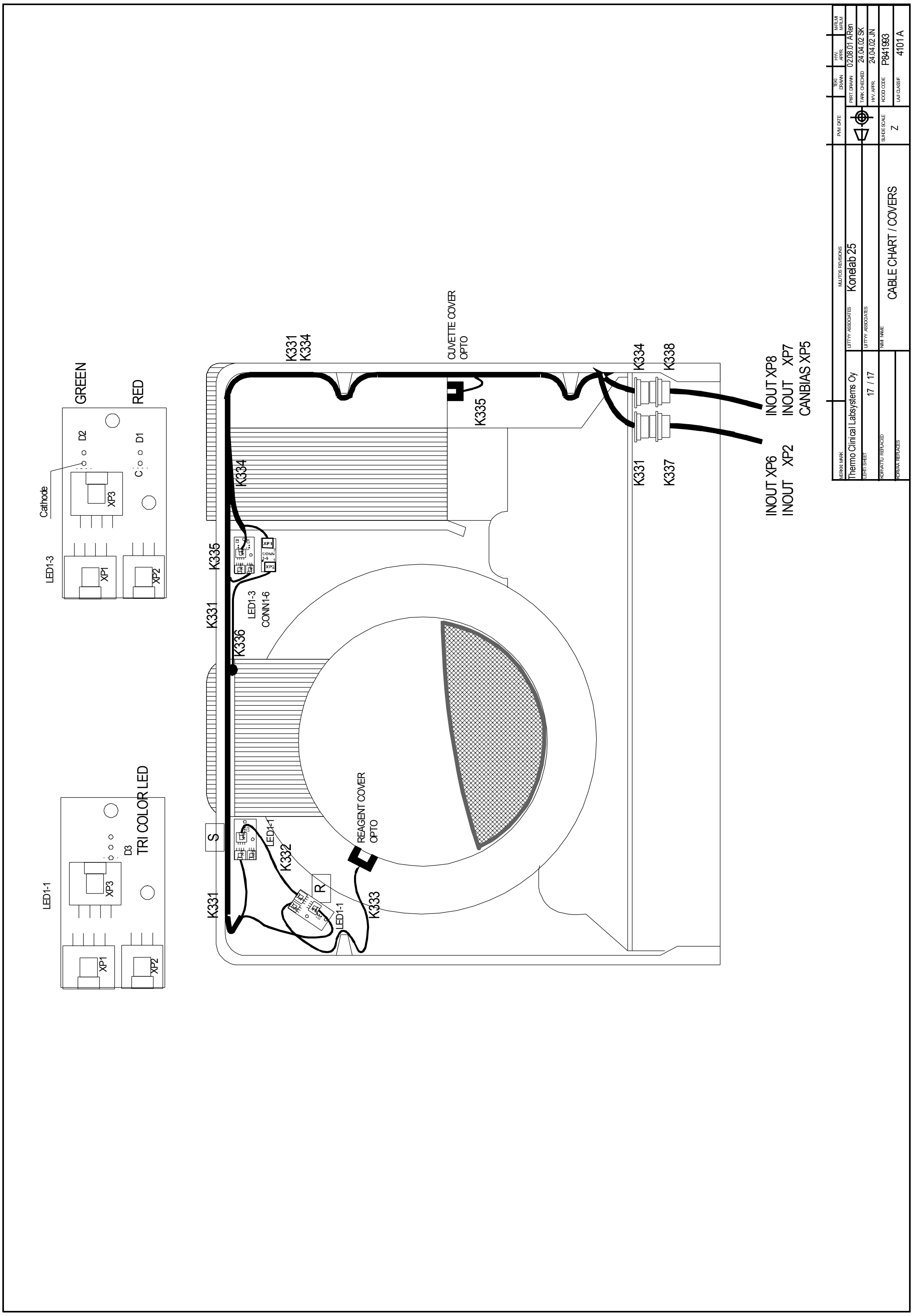


Figure 3-133 Covers (Konelab 20XT, 20XTi)

Section 4 Different Parts of Konelab

Different parts of Konelab are presented here in alphabetical order:

4.1 Arms

4.1.1 Dispensing Arm

Konelab 60 & 30		**840293 p840294E**
6.	SURF-TILTOPTO cable 180	840338
26.	Ground wire D531	831687
27.	SURF-MOTOR cable	840344
29.	Ground wire 500	840551

Refer to next page for Figure.

Konelab 20		**841326 p841327D**
8.	TILTOPTO cable 80	840348
11.	MIXMOTOR cable	841396
23.	SURF-TILTOPTO cable 180	840338
25.	Ground wire D531	831687
26.	SURF-MOTOR cable	841394
29.	Ground wire 500	840551

Refer to page 4-5 for figure.

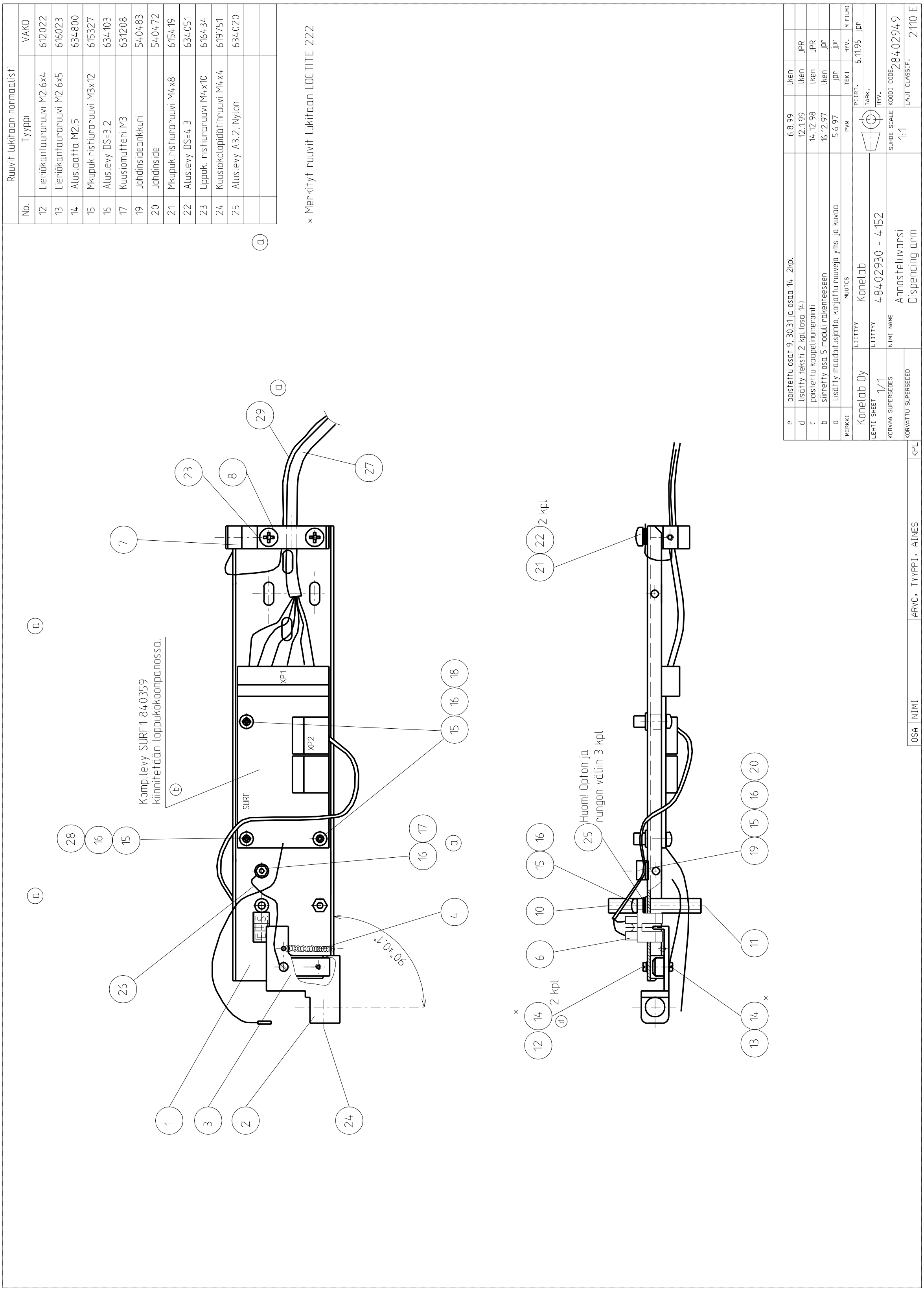


Figure 4-1 Konelab 60 & 30: Dispensing arm 840293

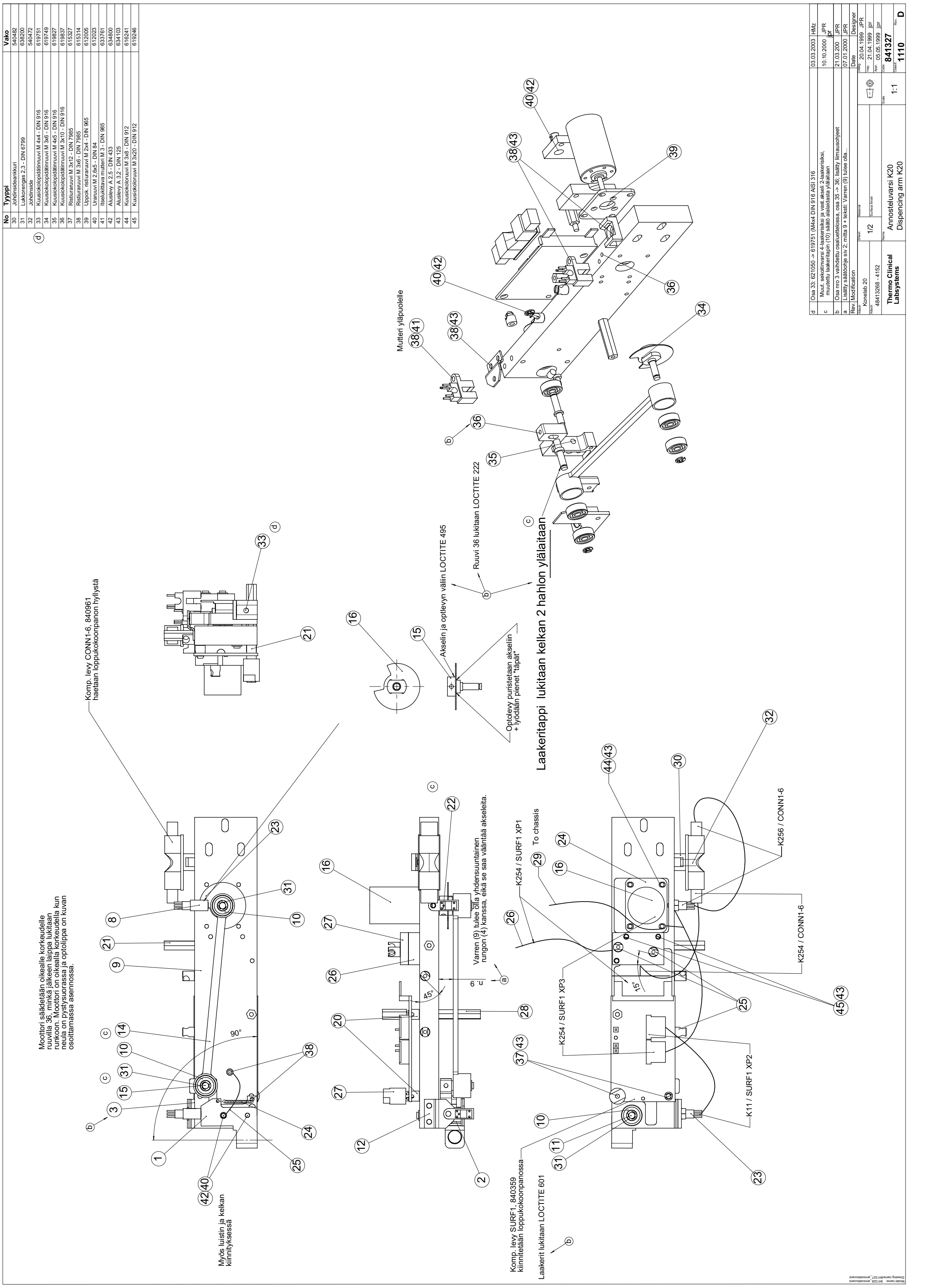


Figure 4-2 Konelab 20: Dispensing arm 841326

4.1.2 ISE Arm

Konelab 60 & 30 & 20		**840169** **p840170J**
24.	SURF-MOTOR-TEMP cable	840340
25.	ISEAMP-ISE cable	840342
32.	SURF-TILTOPTO cable 180	840338
33.	Block heating cable	840392
38.	Ground wire 500	840551
64.	Ground wire D531	831687

Refer to page 4-7 for figure.

4.1.3 Mixer Arm

Konelab 60 & 30		**840275** **p840276E**
5.	MIXMOTOR cable	840367
6.	TILTOPTO cable 80	840348
7.	MIXER-MIX Y-mixer arm cable	840346

Refer to page 4-8 for figure.

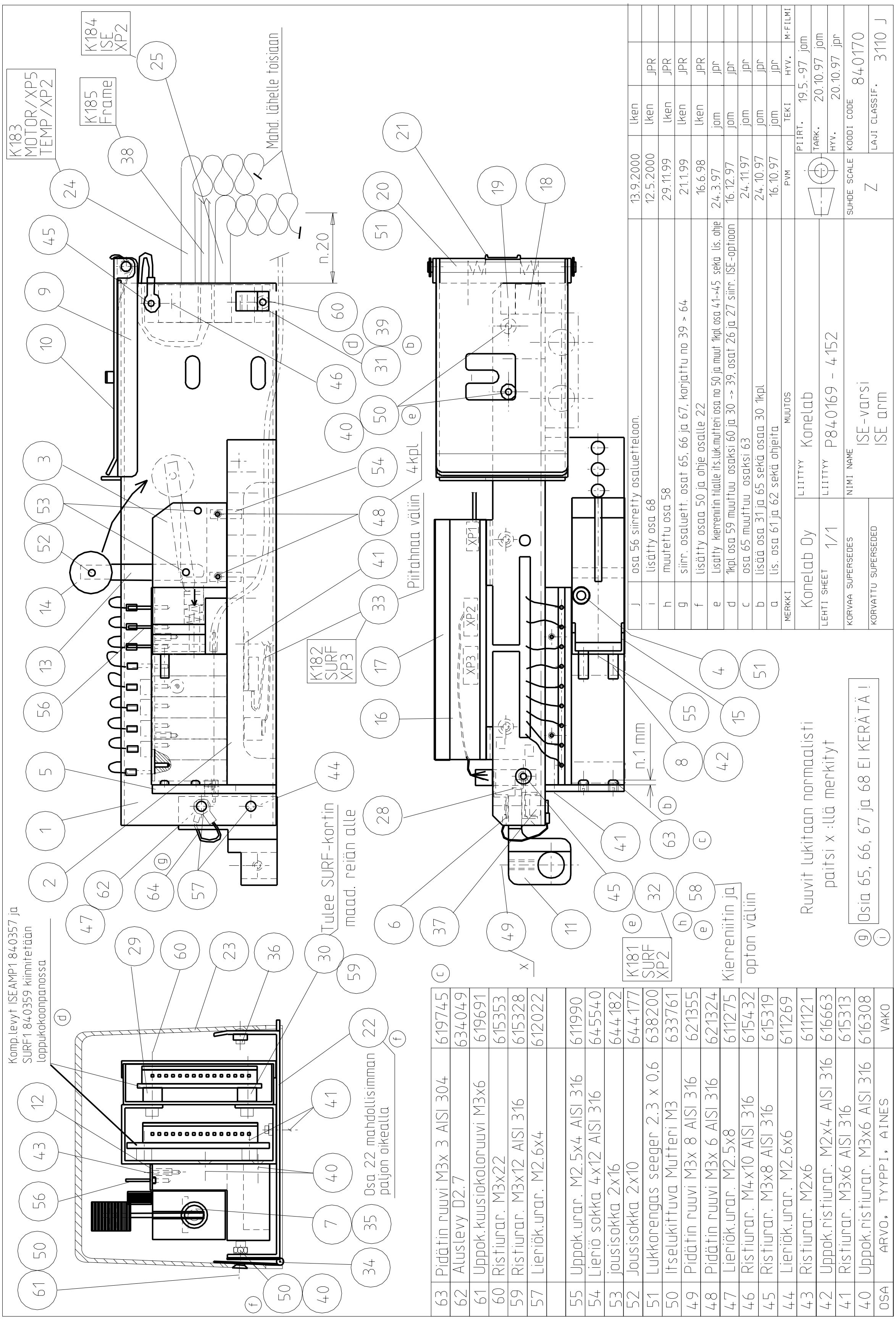


Figure 4-3 Konelab 60 & 30 & 20: ISE Arm 840169

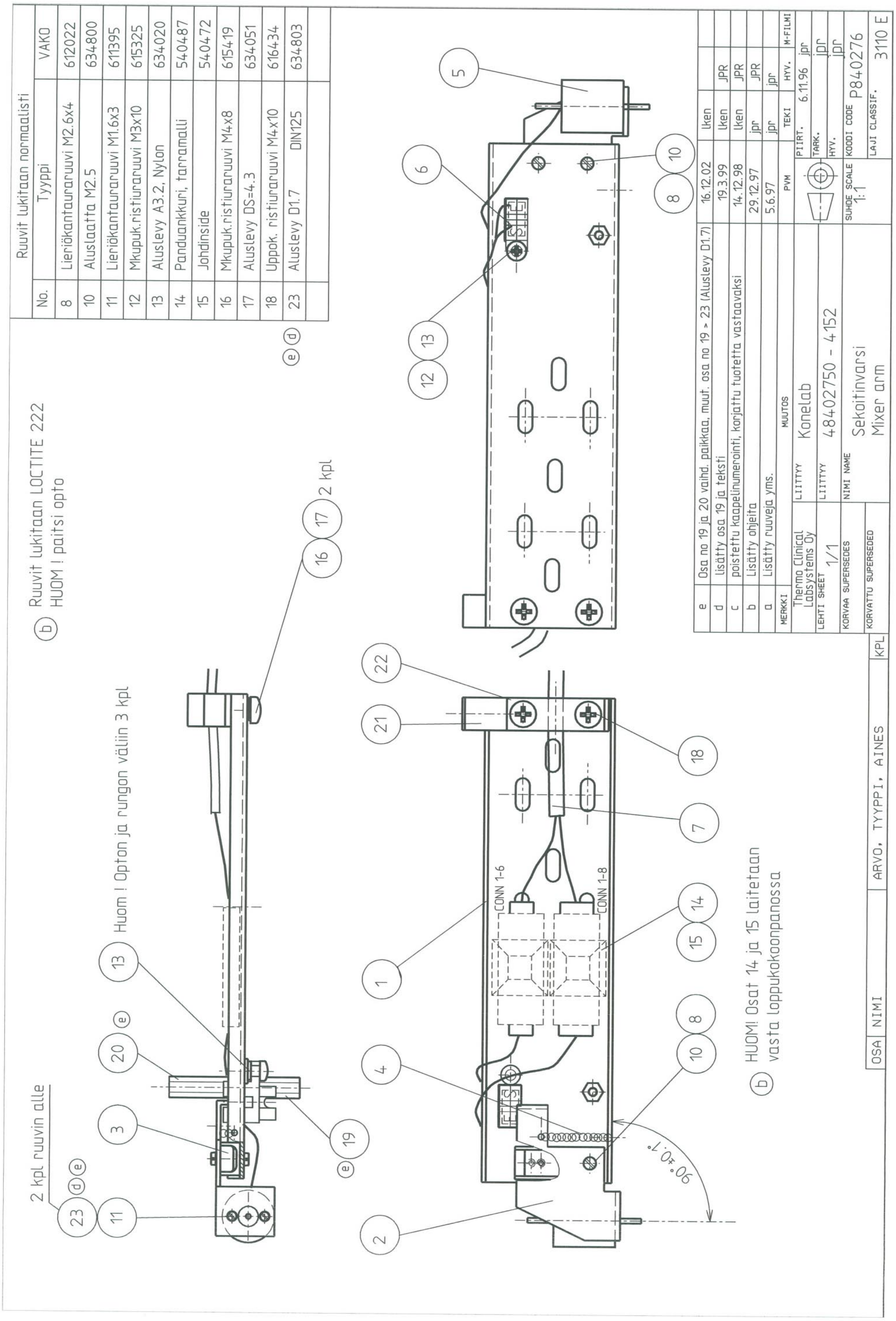


Figure 4-4 Konelab 60 & 30: Mixer arm 840275

4.2 Back Panel

Konelab 60		**840374** **p840375A**
8.	Brushless DC Fan 24 V	570264
9.	Antenna wire	711548
10.	Antenna wire	711559

Refer to next page for figure.

Konelab 30		**840376** **p840377A**
8.	Brushless DC Fan 24 V	570264
9.	Antenna wire	711548
10.	Antenna wire	711559

Refer to page 4-11 for figure.

Konelab 20		**841380** **p841412A**
8.	Brushless DC Fan 24 V	570264

Refer to page 4-12 for figure.

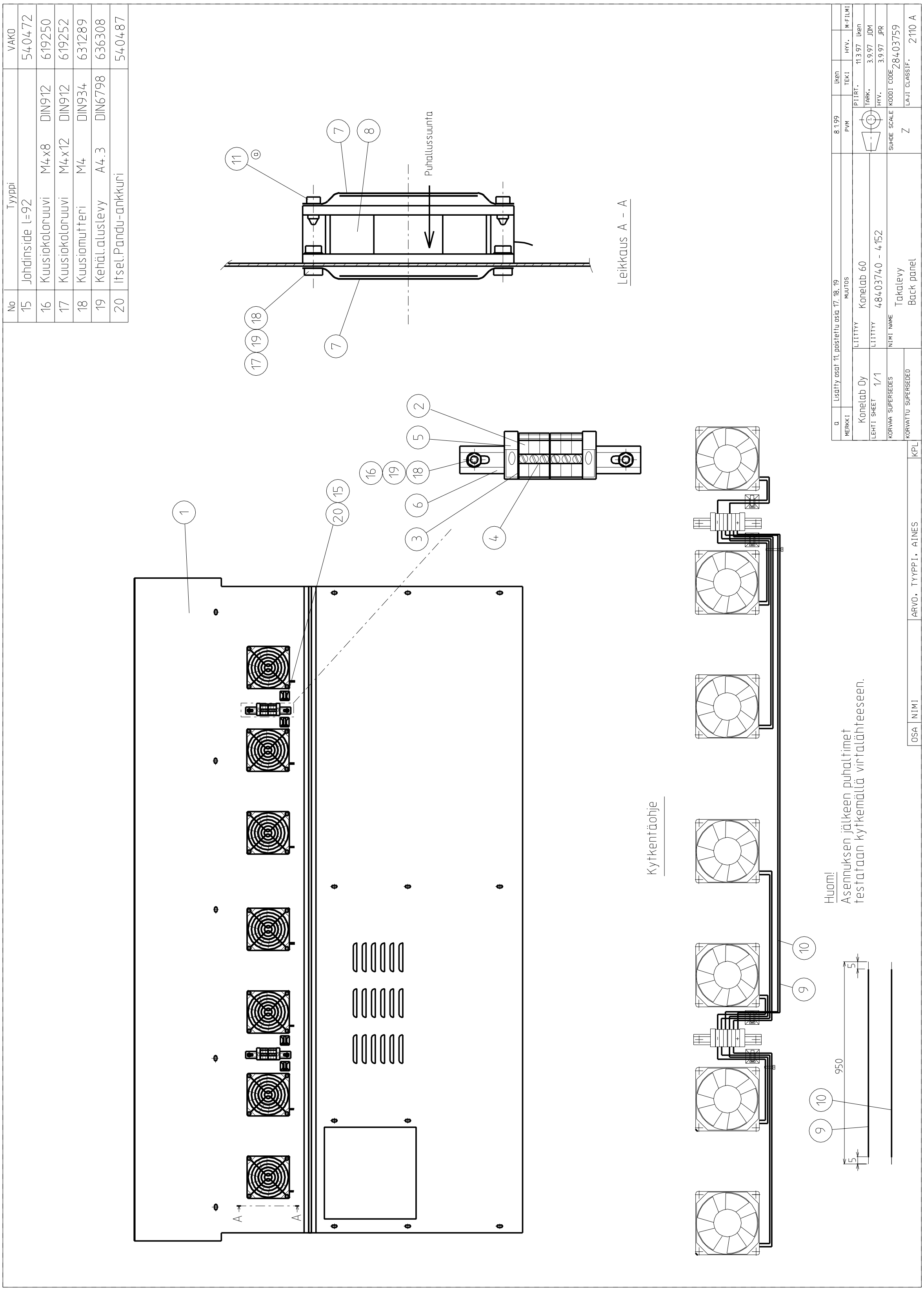


Figure 4-5 Konelab 60: Back panel 840374

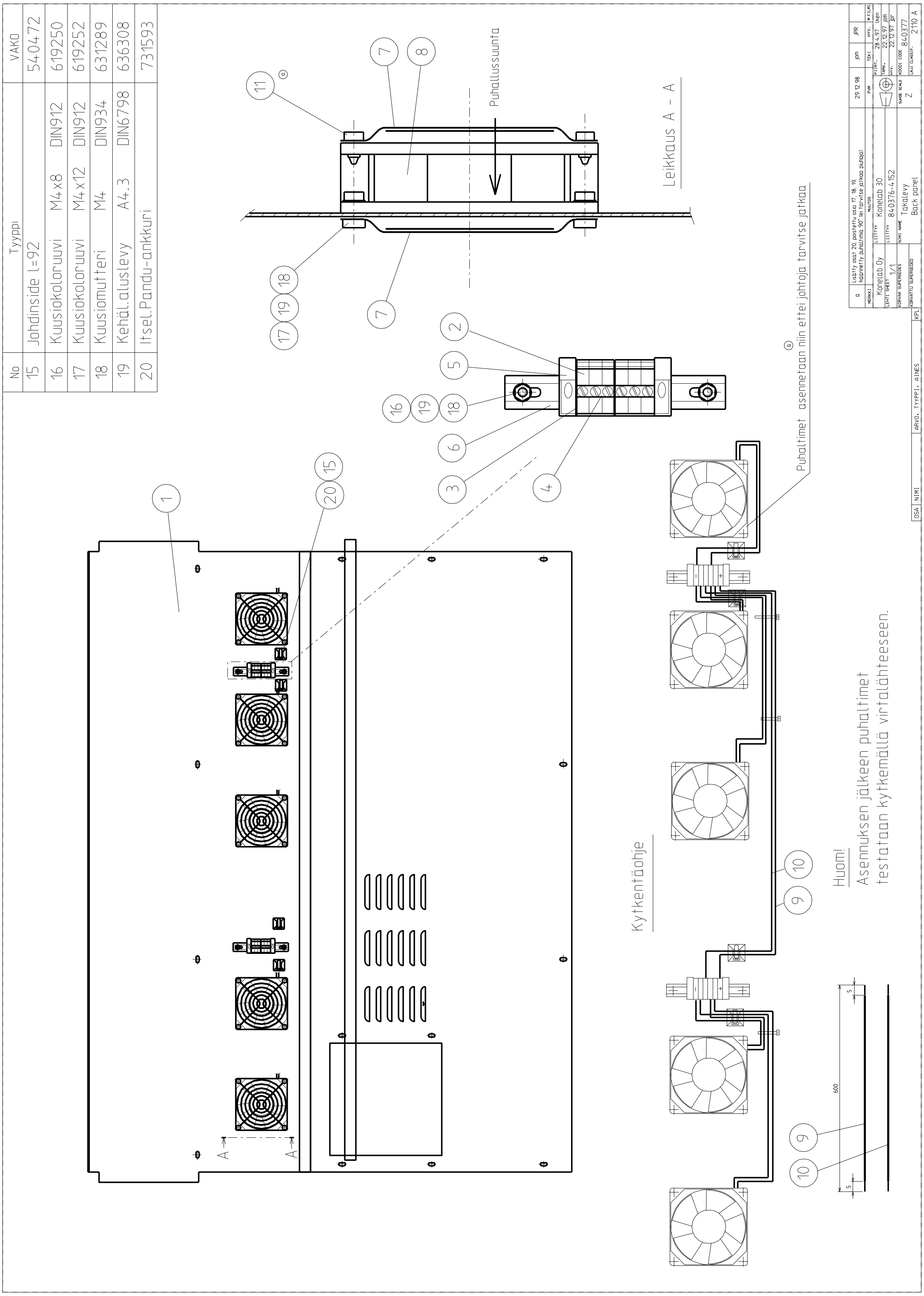


Figure 4-6 Konelab 30: Back panel 840376

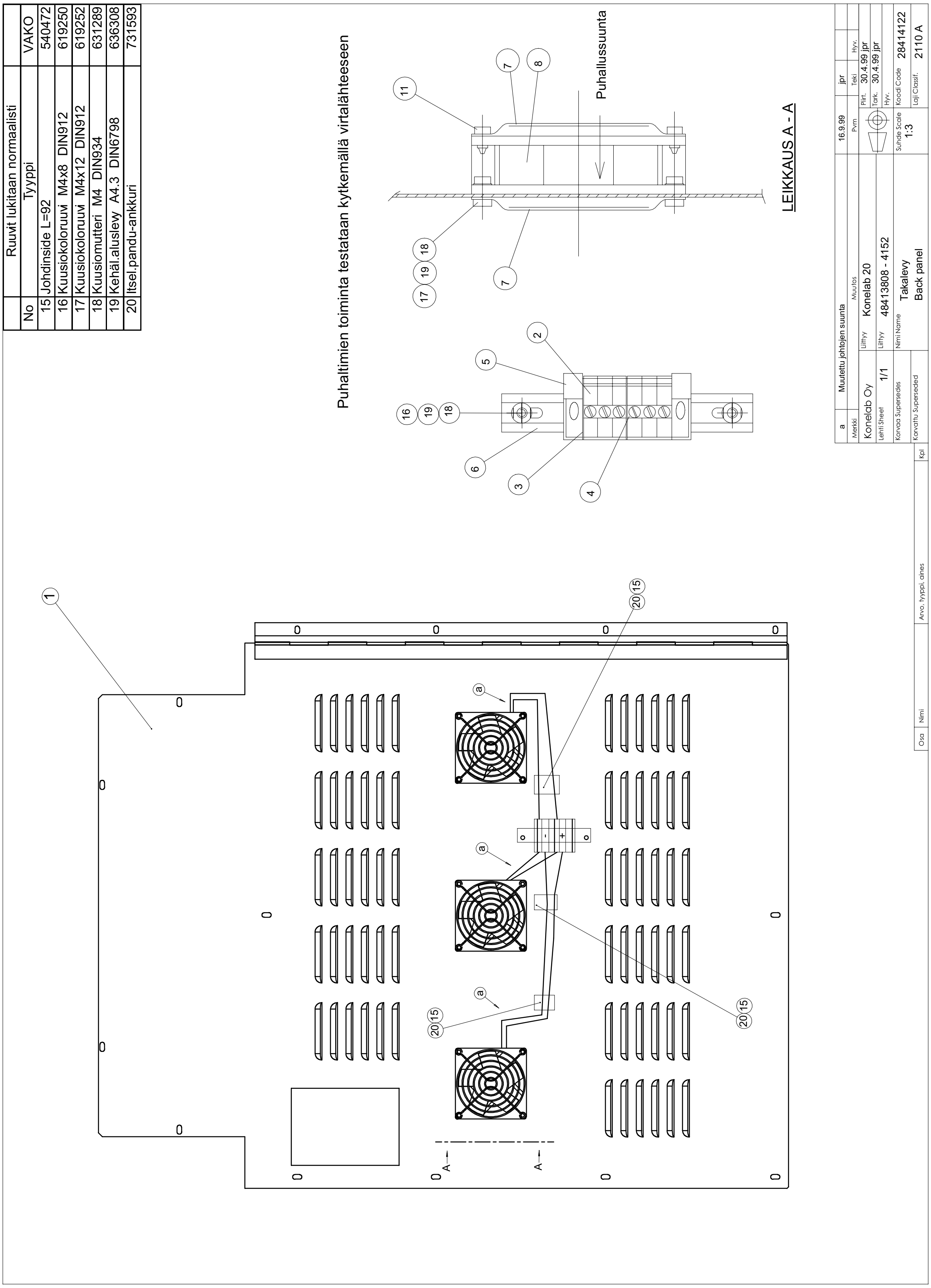


Figure 4-7 Konelab 20: Back panel 841380

4.3 Connector Panel

Konelab 60		**840372** **p840373G**
F1	Circuit breaker	511952
S1	Power switch	521521
XP1	Mains inlet	540017
2.	Ethernet cable	840716

Refer to next page for figure.

Konelab 30		**840858** **p840859C**
S1	Power switch	521521
XP1	Mains inlet	540017
2.	Ethernet cable	840716

Refer to page 4-15 for figure.

Konelab 20		**841378** **p841393B**
F1	Circuit breaker	511952
S1	Power switch	521521
XP1	Mains inlet	540017
2.	Ethernet cable	841432

Refer to page 4-16 for figure.

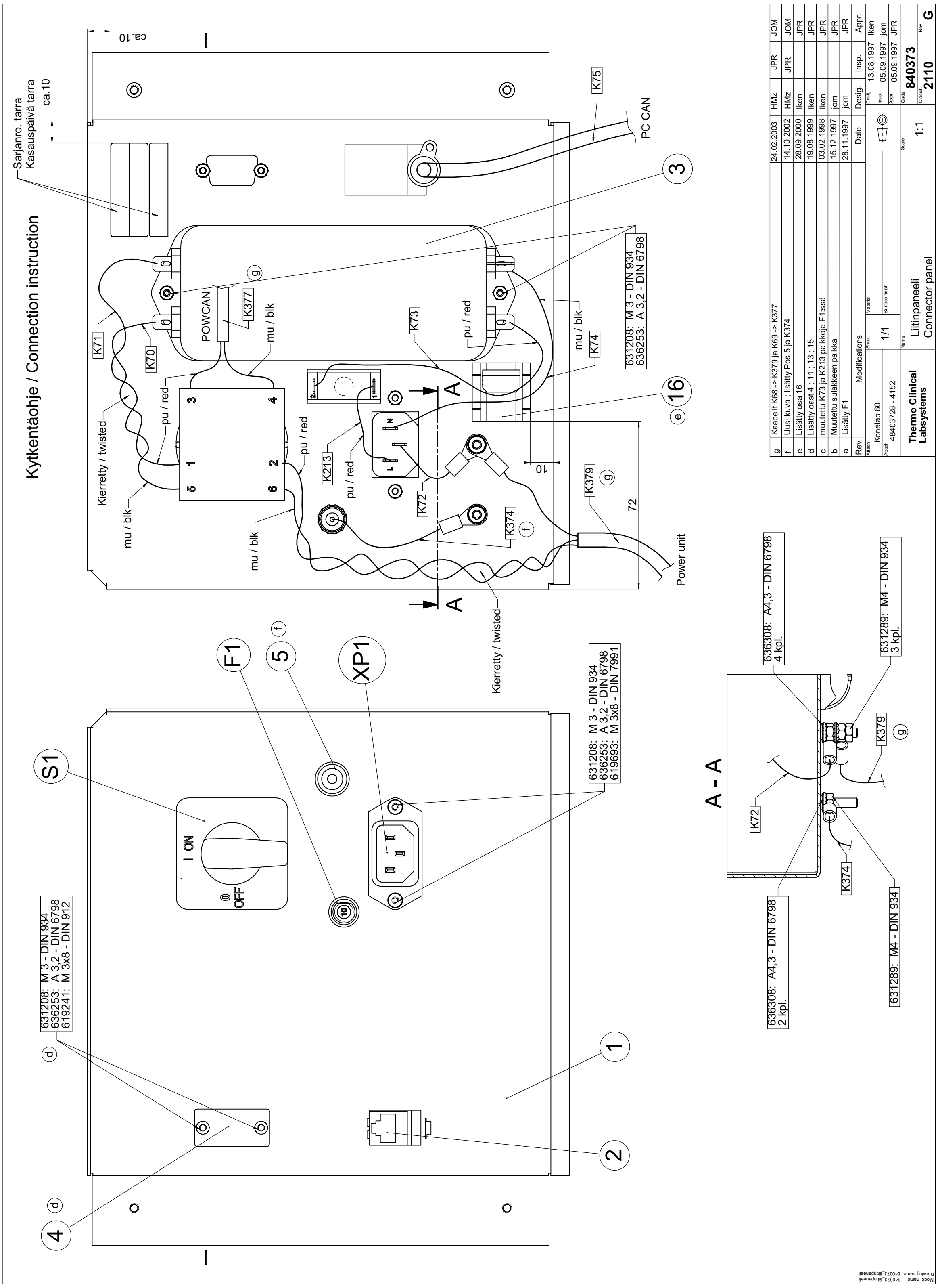


Figure 4-8 Konelab 60: Connector panel 840372

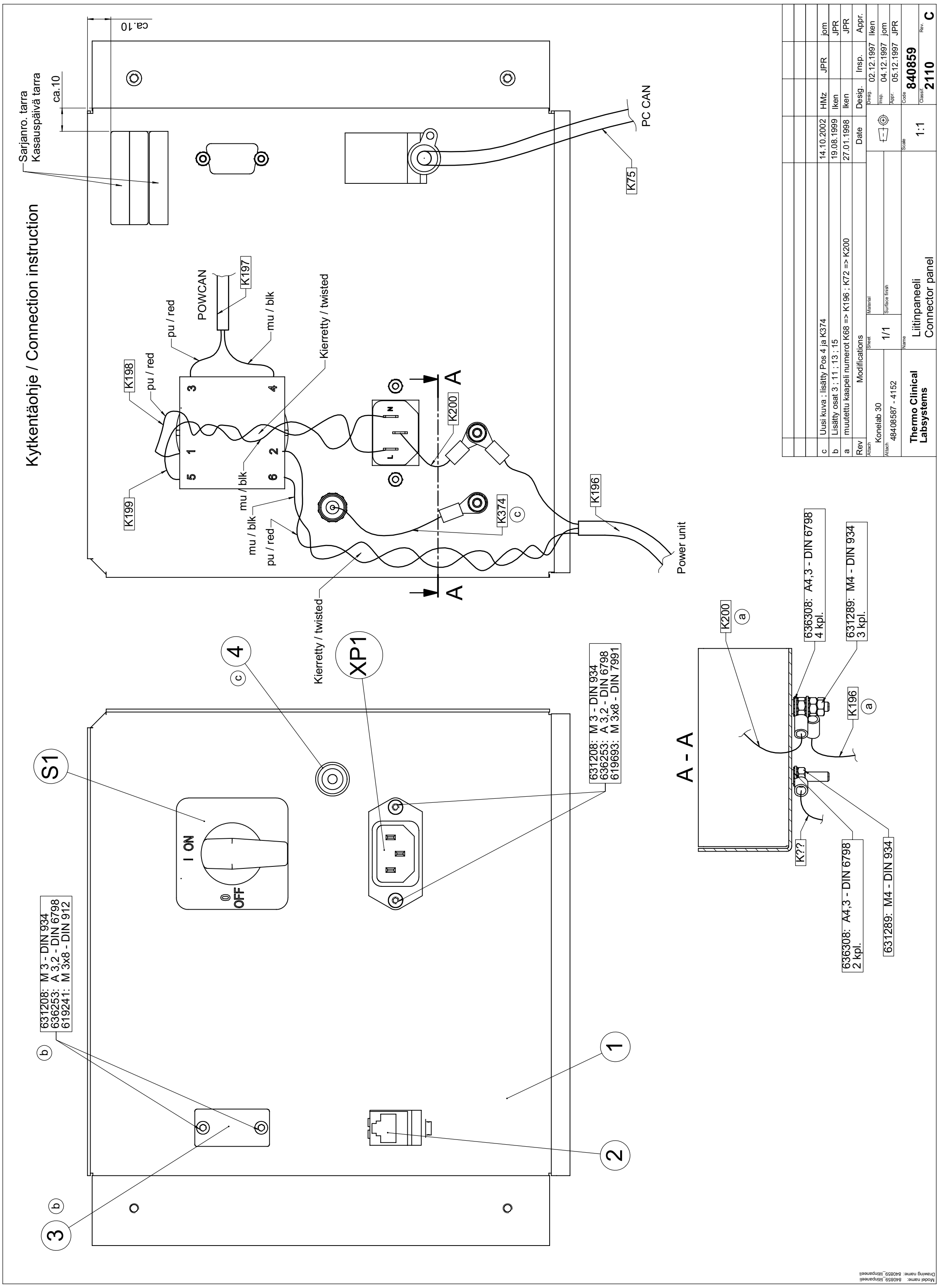


Figure 4-9 Konelab 30: Connector panel 840858

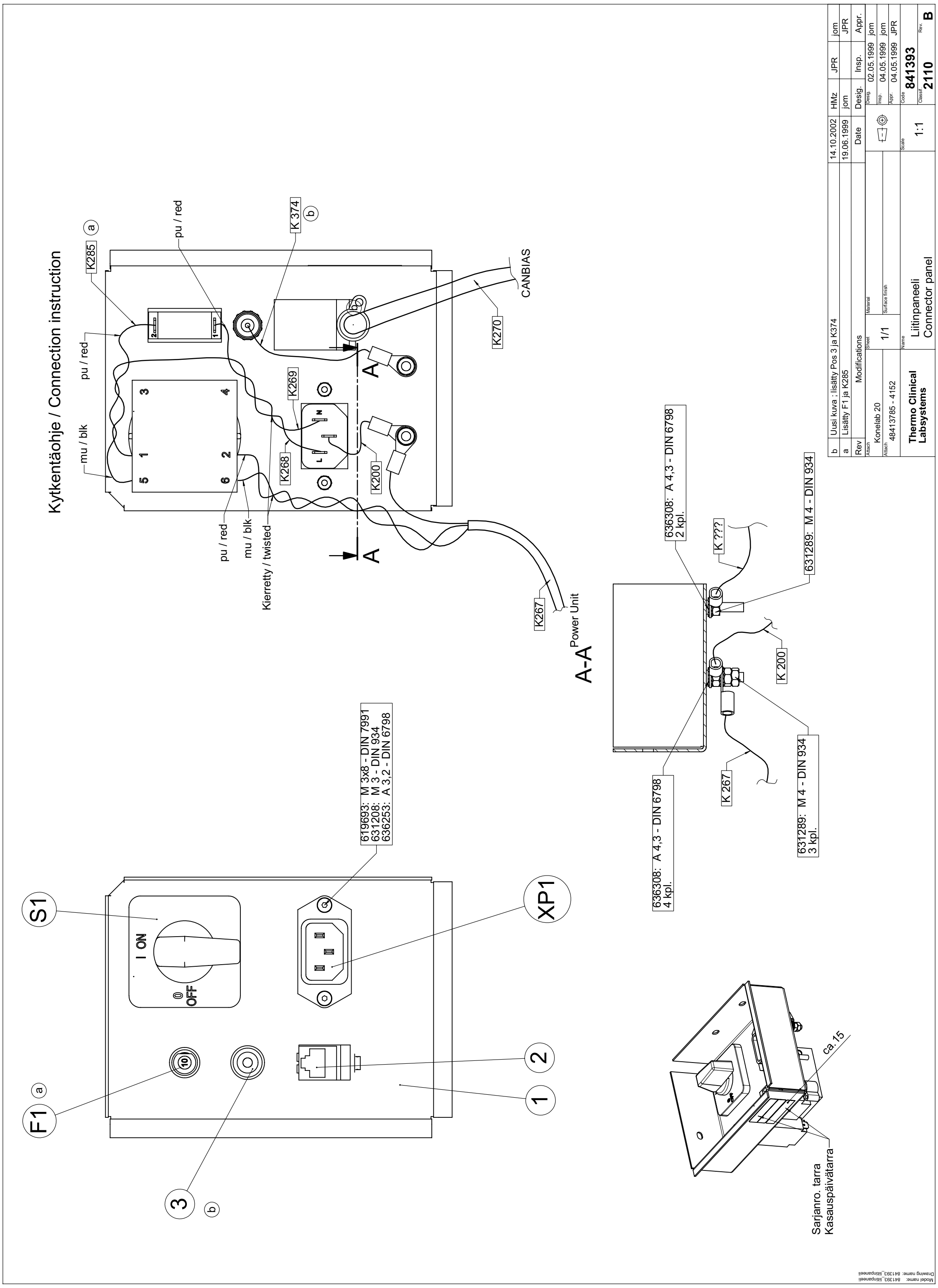


Figure 4-10 Konelab 20: Connector panel 841378

4.4 Cuvette Loader

4.4.1 Konelab 60

Cuvette feeder		840233 p840234J
1.	Cuvette path	840235
12.	Opto cable 620	840302
21.	Extension cable 600	840380

Refer to page 4-19 for figure.

Cuvette magazine		840221 p840222D
1.	Magazine	840223
5.	Front latch	840227
6.	Rear latch	840228
19.	Switch lever	840231

Refer to page 4-20 for figure.

Cuvette pusher		840198 p840199I
1.	Timing belt	840213
3.	Extension cable 1500	840691
4.	Extension cable 600	840380
9.	Stepper motor	570114
14.	Pusher arm	840205
19.	Pusher	840210
21.	Opto cable 620	840302
34.	Wide gap opto cable 620	840417

Refer to page 4-21 for figure.

Mover unit		840239 p840240F
6.	Stepper motor	570114
13.	Pusher	840246
16.	Opto cable 620	840302
34.	Extension cable 600	840380

Refer to page 4-22 for figure.

Rotation unit		840214 p840215C
6.	Stepper motor + cable	840674
7.	Linear motor+cable	840396
8.	Opto cable 620	840302
29.	Linear motor extension cable 500	840398
30.	Extension cable 600	840380

Refer to page 4-23 for figure.

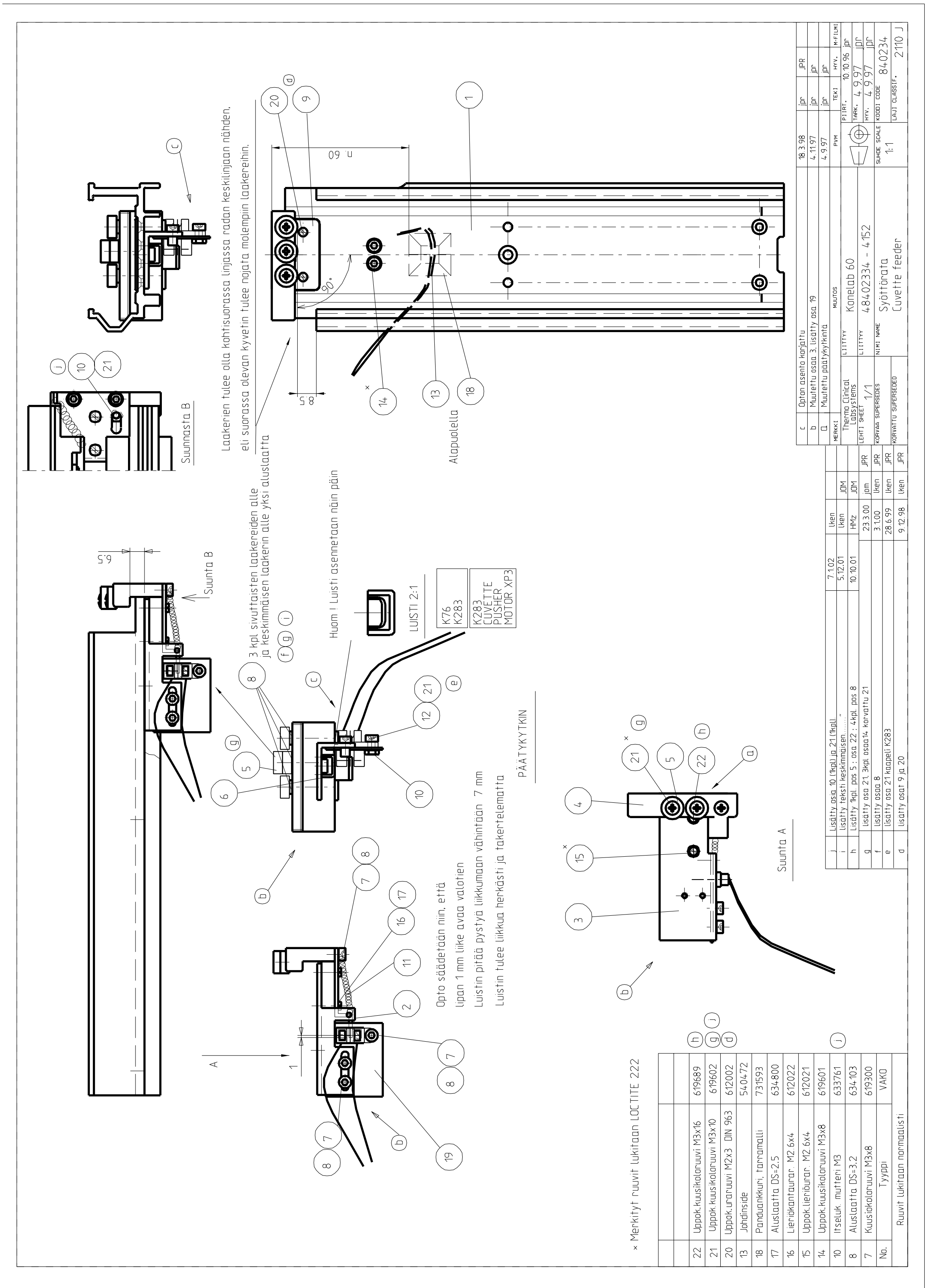


Figure 4-11 Konelab 60: Cuvette feeder 840233

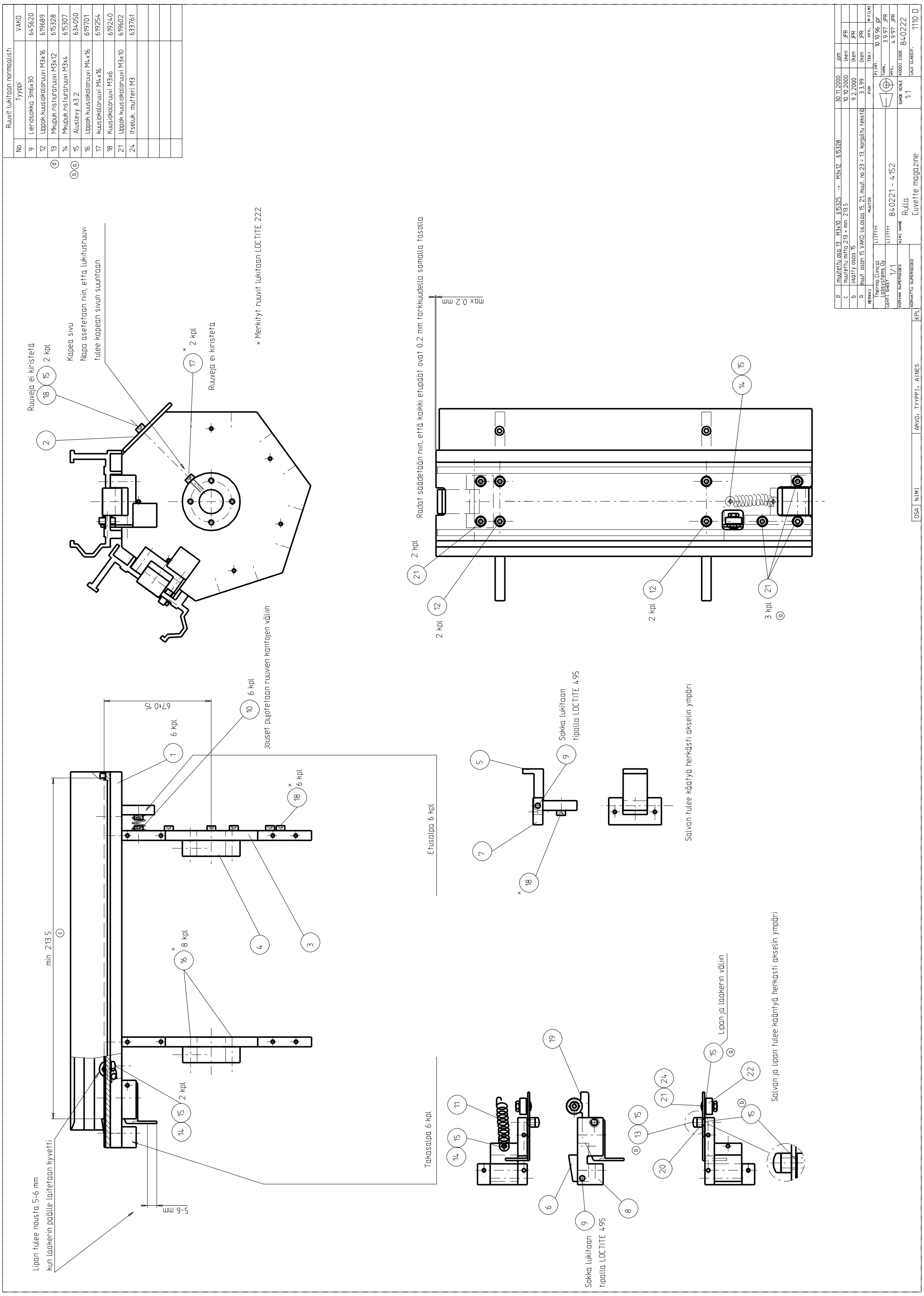


Figure 4-12 Konelab 60: Cuvette magazine 840221

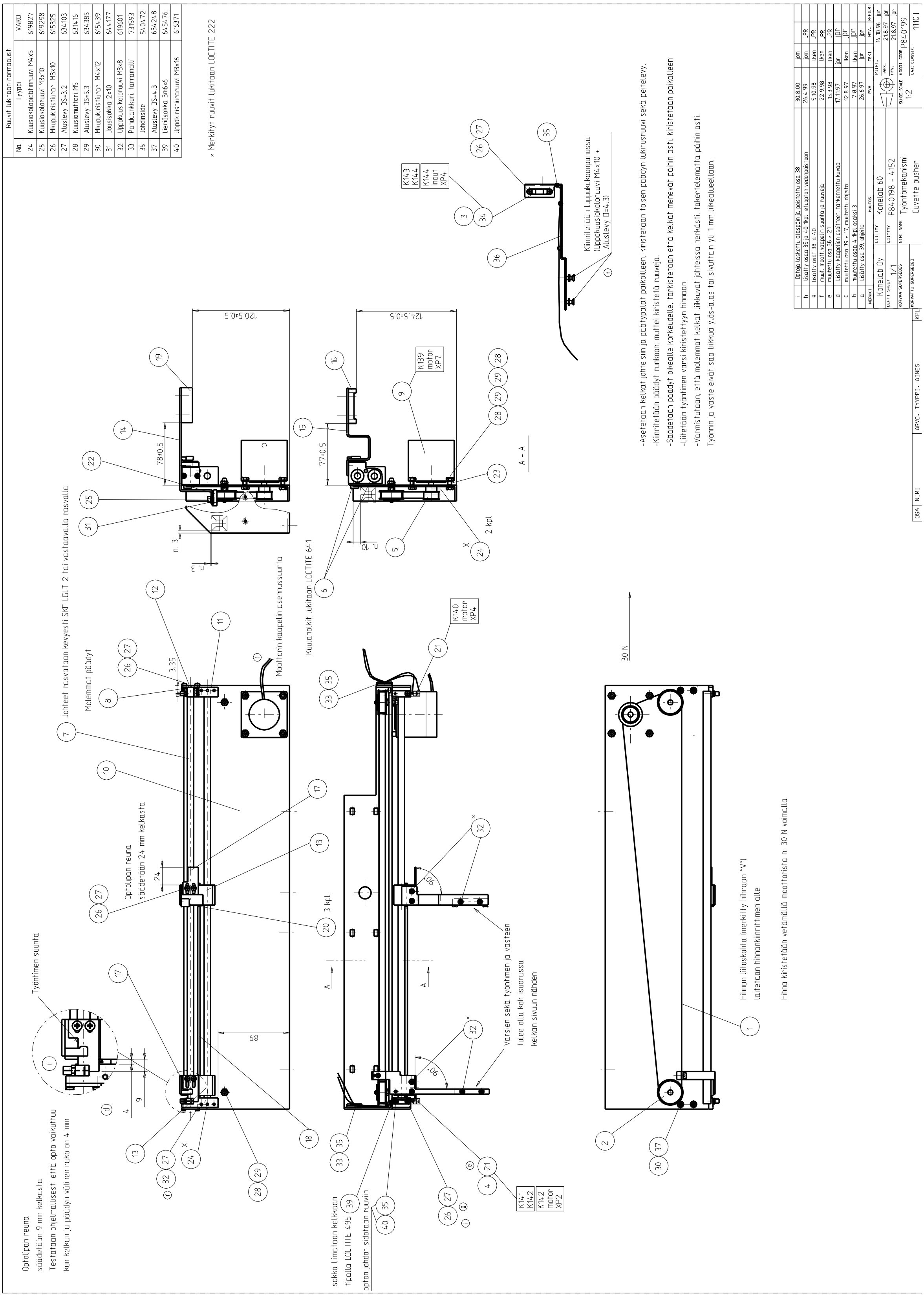


Figure 4-13 Konelab 60: Cuvette pusher 840198

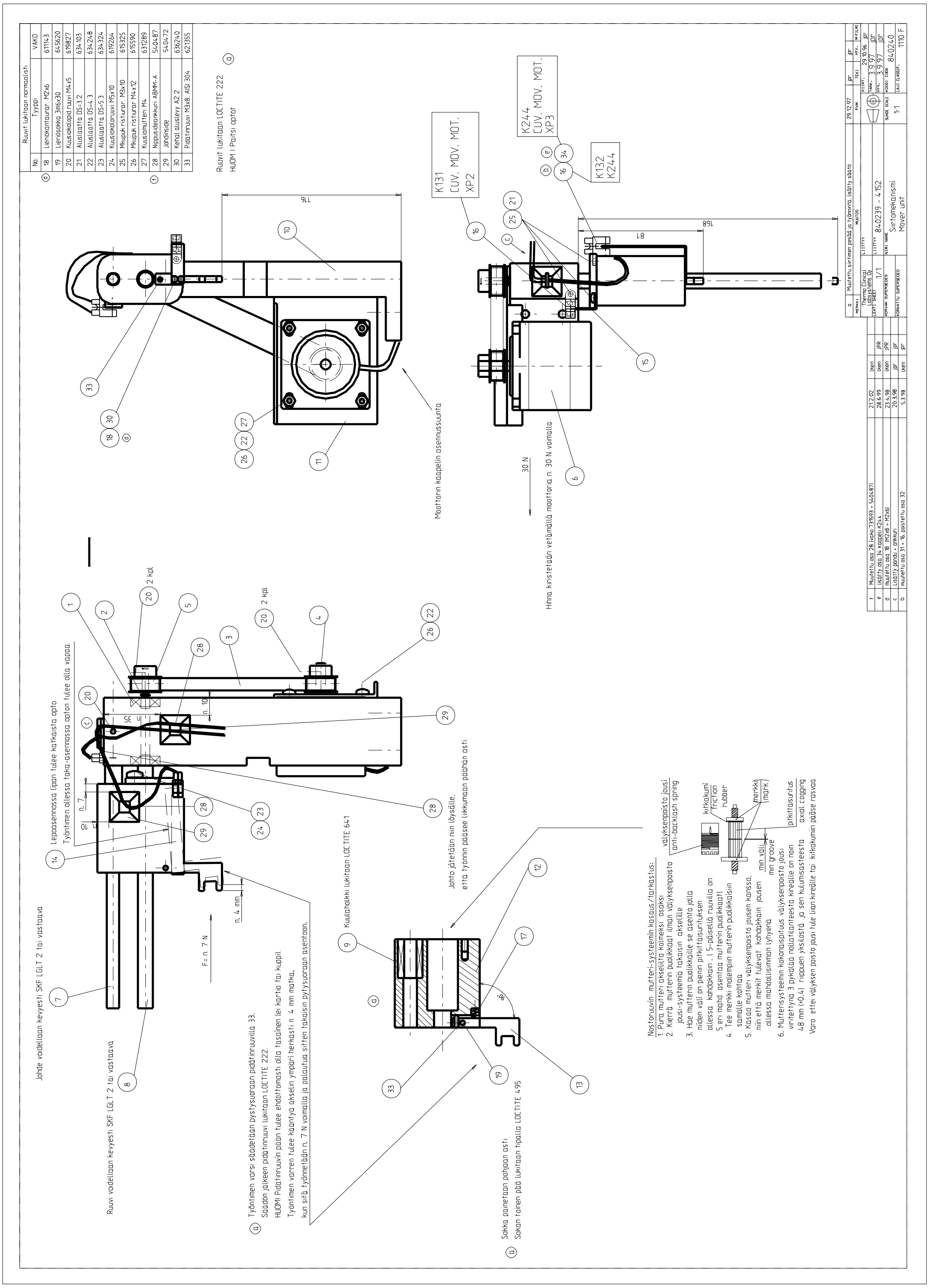


Figure 4-14 Konelab 60: Mover unit 840239

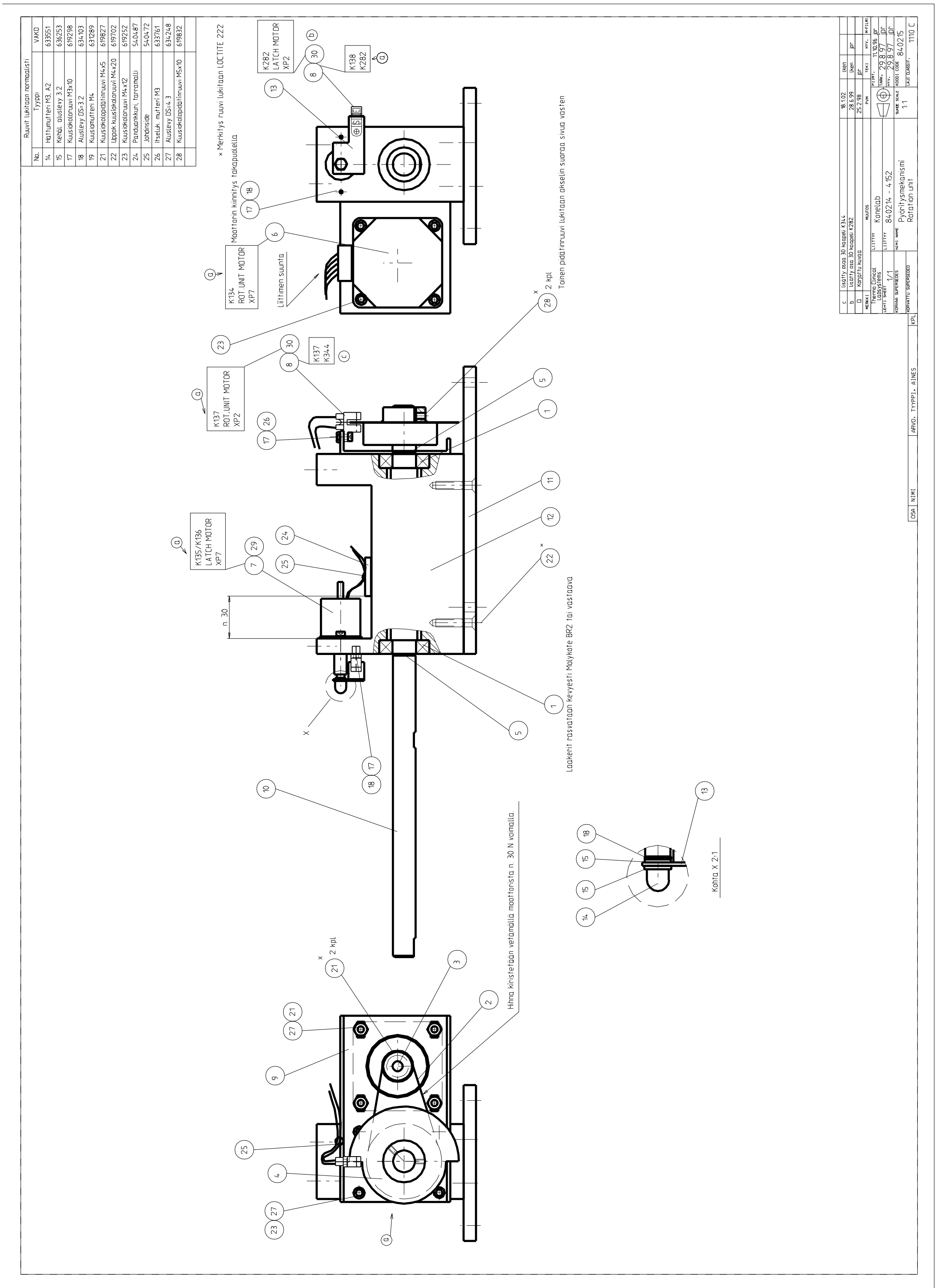


Figure 4-15 Konelab 60: Rotation unit 840214

4.4.2 Konelab 30 & 20

Cuvette loader		**840511 p840512H**
1.	Rear latch	840228
3.	Opto cable 620	840302
5.	Extension cable 600	840380
6.	Stopper latch	840513
7.	Detector plate, back	840514
8.	Detector plate, middle	840515
9.	Central latch	840516
17.	Cuvette detector arm	840524
20.	Front pushe	840527
36.	Stepper motor	570114
42.	Wide gap opto cable 620	840417

Refer to next page for Figure.

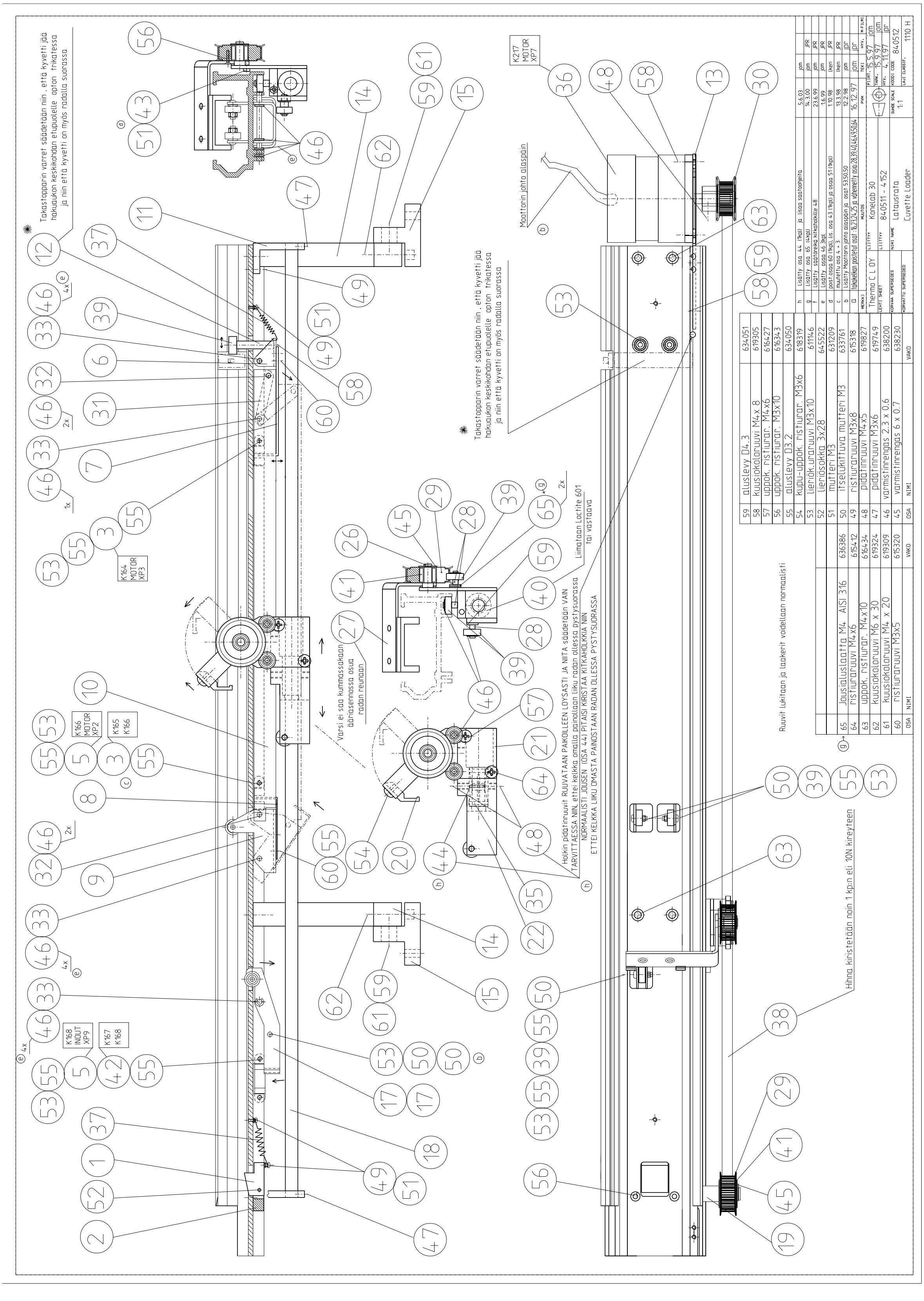


Figure 4-16 Konelab 30 & 20: Cuvette loader 840512

4.5 Dispensing Drive Unit

Konelab 60 & 30 & 20		**840000 p840001F**
5.	Dispensing arm holder	840006
24.	Opto cable 620	840302
25.	Stepper motor	570114

Refer to next page for figure.

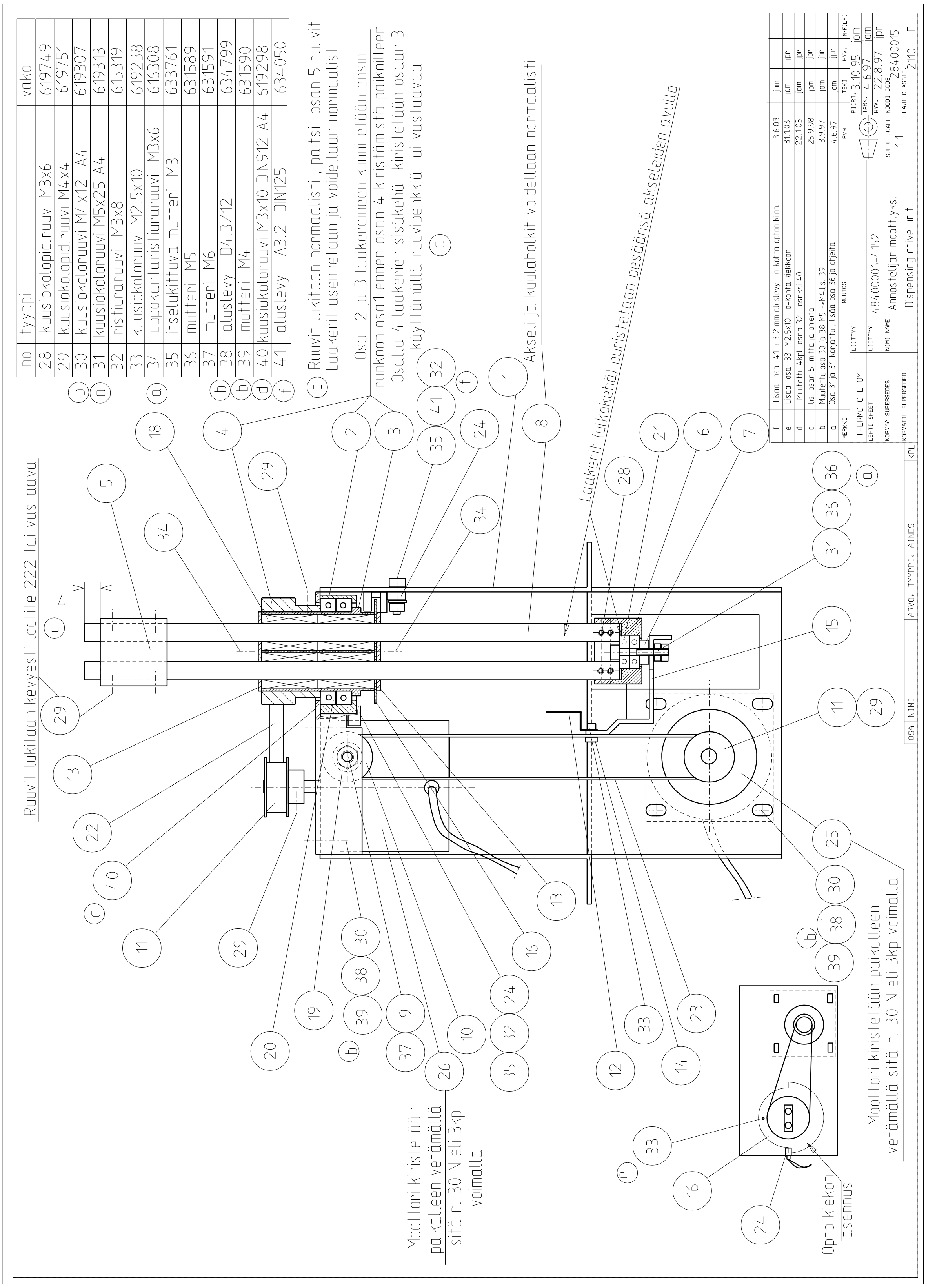


Figure 4-17 Konelab 60 & 30 & 20: Dispensing drive unit 840000

4.6 Driving Unit

Konelab 60 & 30		**840046 p840047C**
11.	Opto cable 620	840302
12.	Encoder unit	840058

Refer to next page for figure.

Konelab 20		**841360 p841361B**
2.	Encoder unit	840058
3.	Opto cable 620	840302
11.	Stepper motor	570118

Refer to page 4-30 for figure.

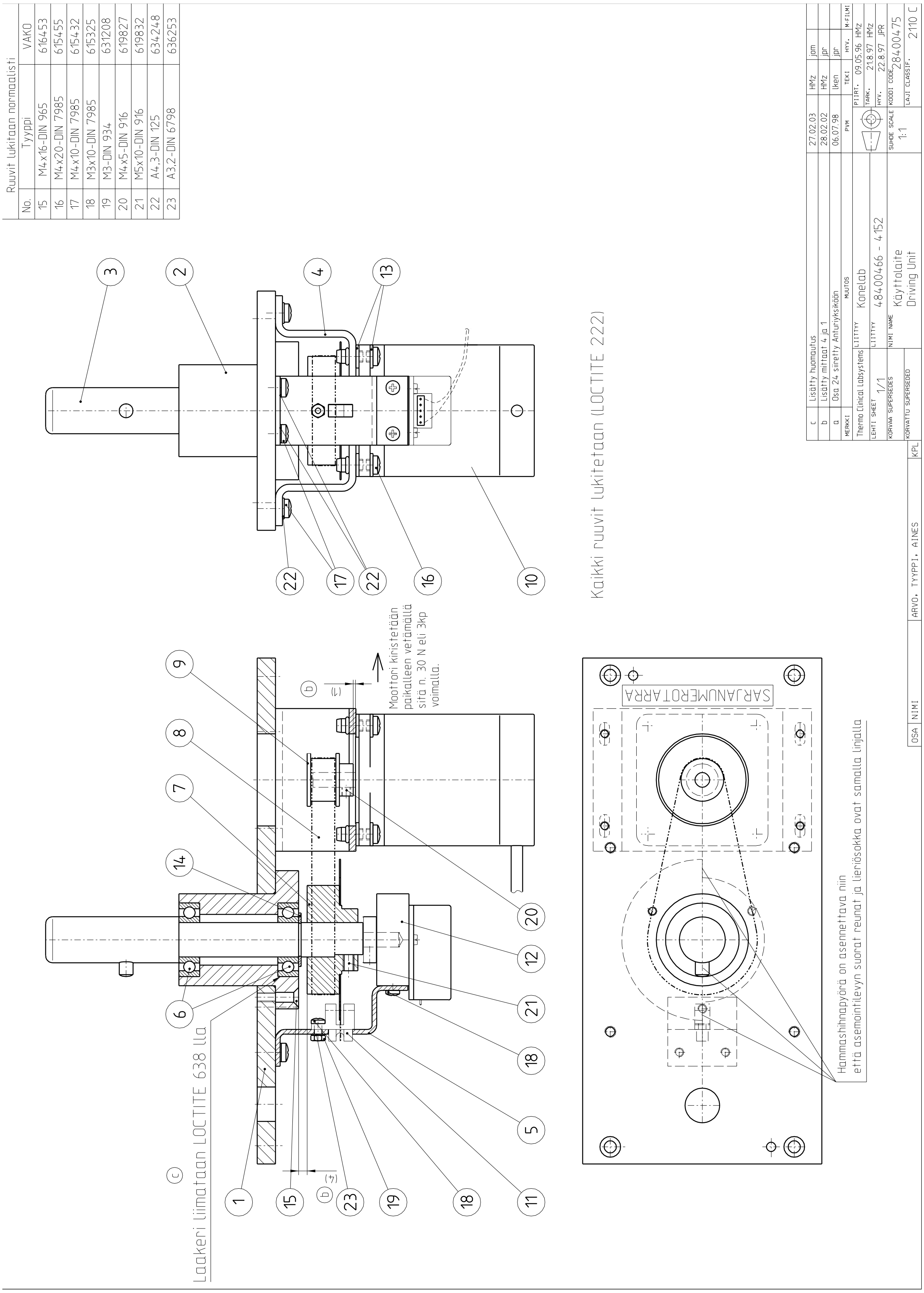


Figure 4-18 Konelab 60 & 30: Driving unit 840046

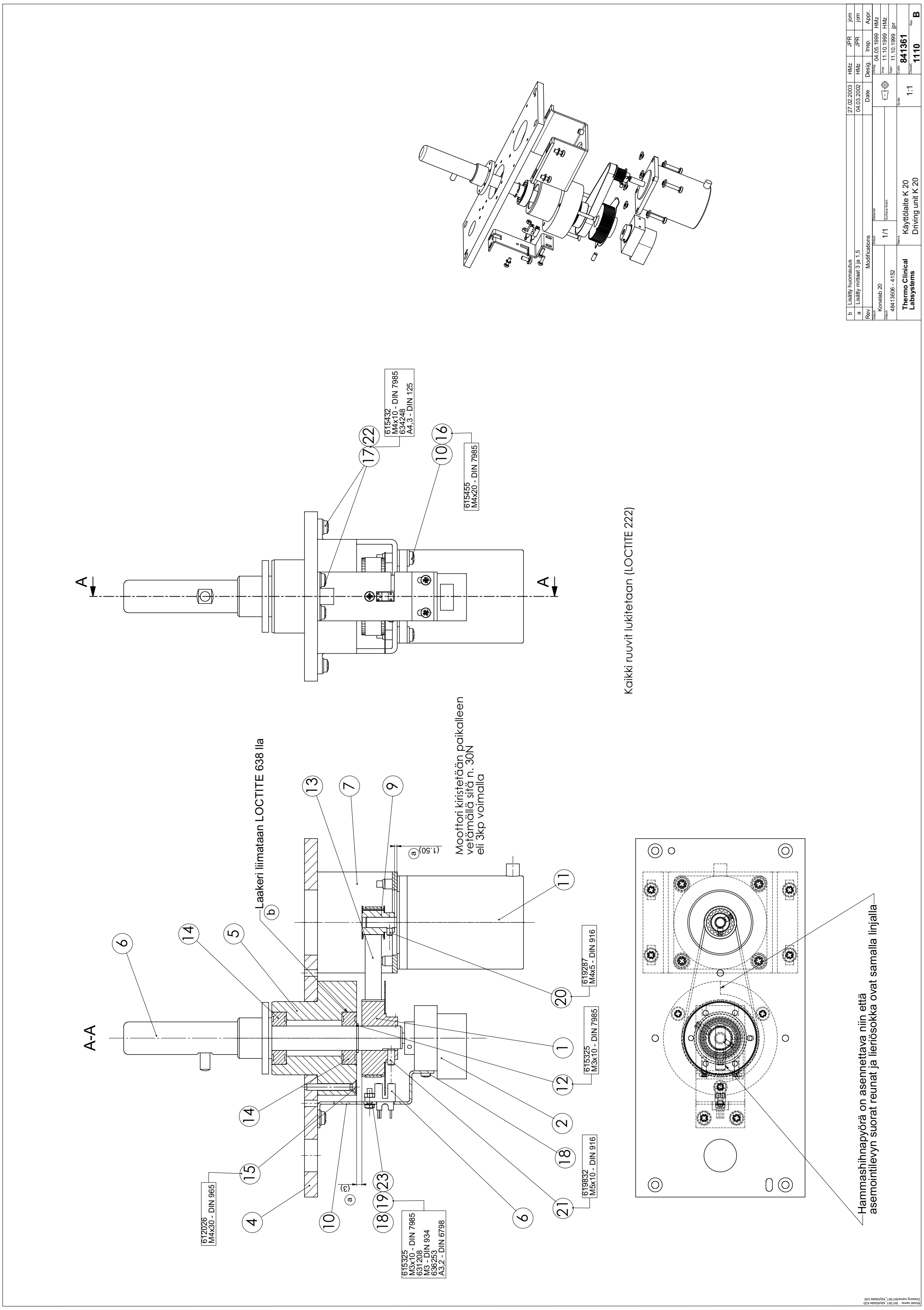


Figure 4-19 Konelab 20: Driving unit 841360

4.7 Incubating Unit

Konelab 60		**840127** **p840128G**
2.	Incubating disk	840070
3.	Dispensing channel	840078
4.	Measuring channel	840088
9.	Incubating disk's heating cable	840333
10.	Opto cable 620	840302
11.	Extension cable 600	840380

Refer to next page for figure.

4.7.1 Dispensing Channel

Konelab 60		**840078** **p840079I**
2.	Cuvette arm	840076
13.	Heating cable	840335
14.	Reflective opto cable	840378
15.	Extension cable 1500	840691
16.	Thermistor cable 50	840790

Refer to page 4-33 for figure.

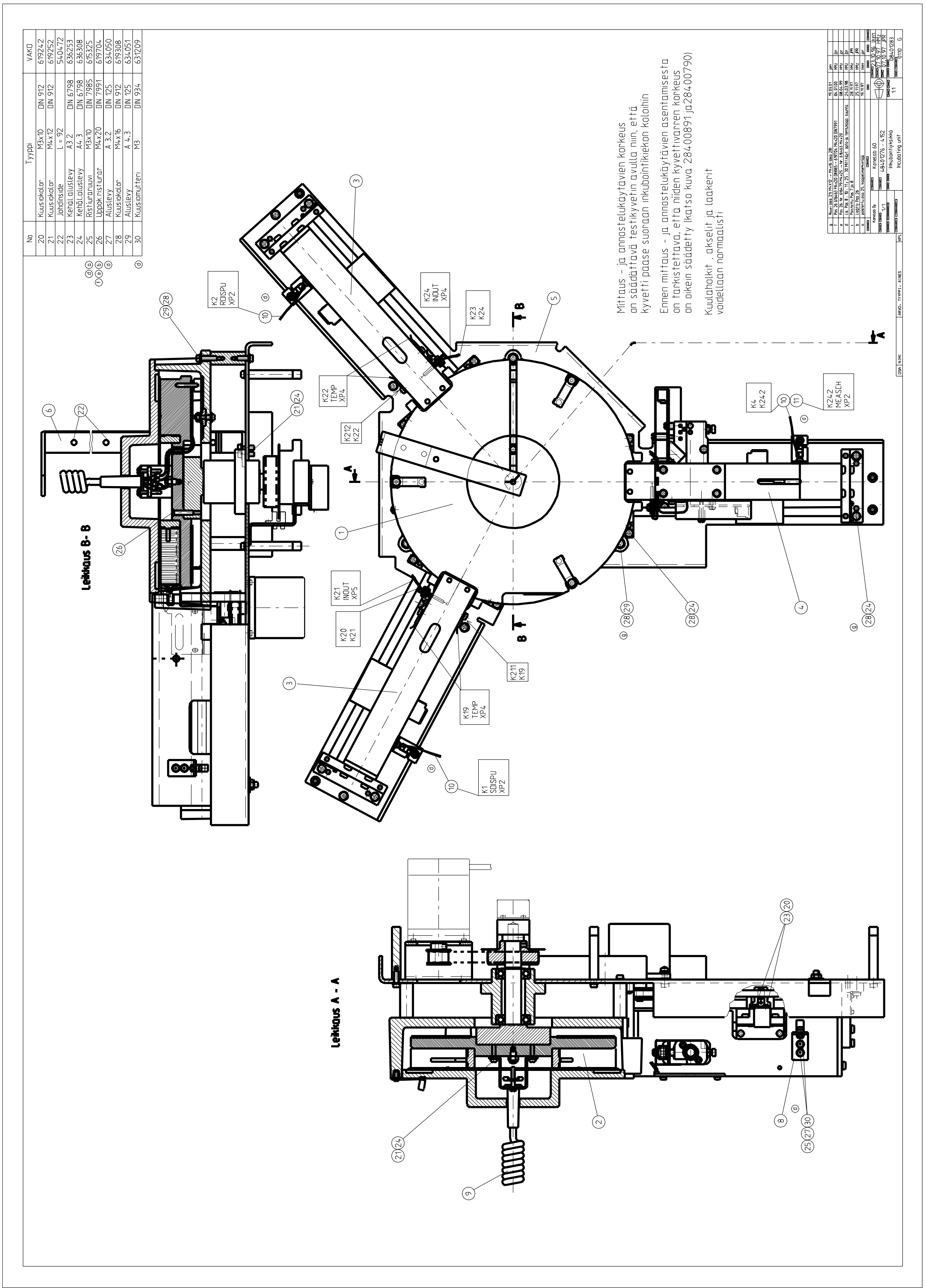


Figure 4-20 Konelab 60: Incubating unit 840127

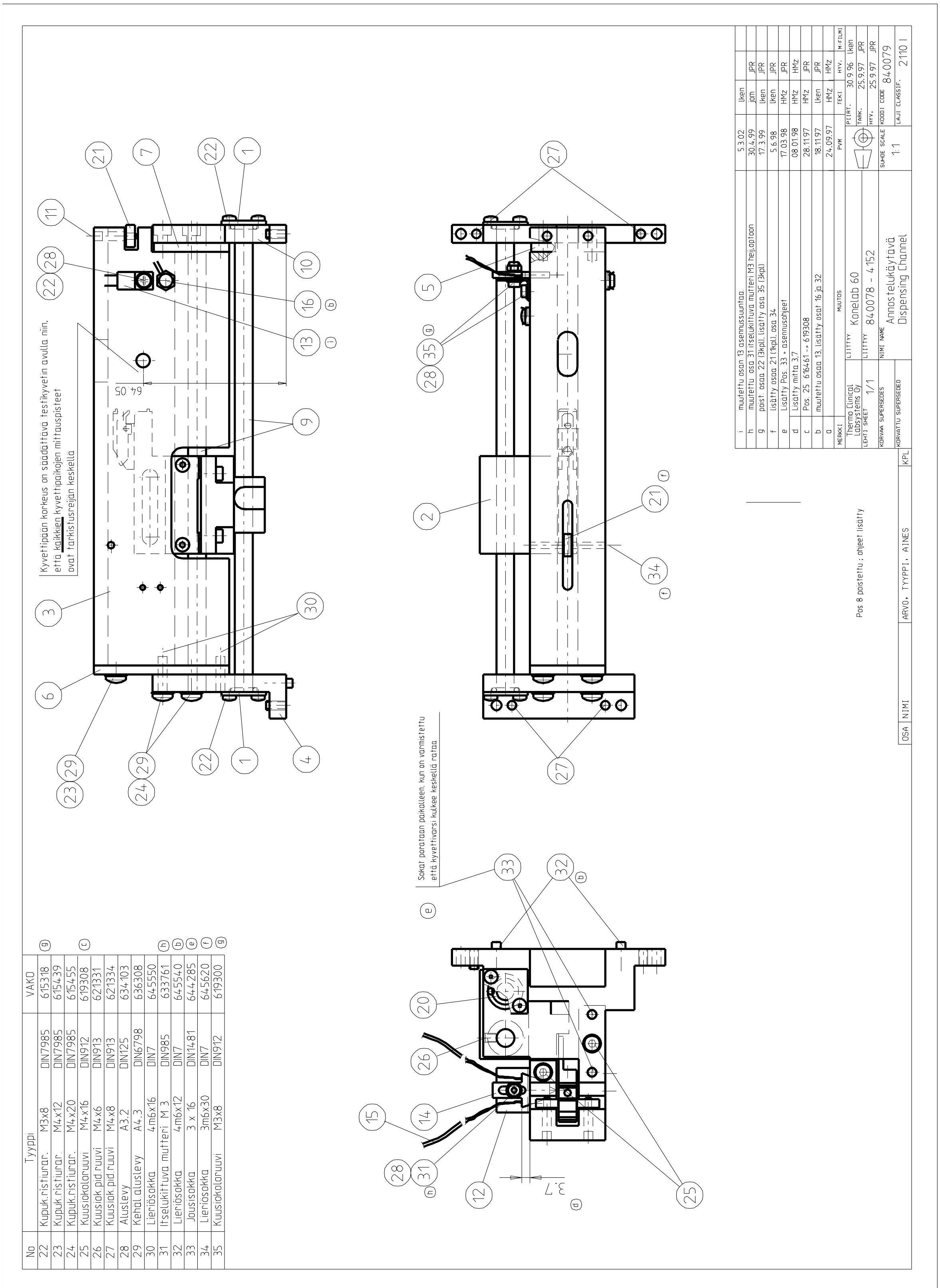


Figure 4-21 Konelab 60: Dispensing channel 840078

4.7.2 Measuring Channel

Konelab 60		**840088 p840089I**
2.	Cuvette arm	840076
15.	Measuring head	886060
20.	Heating cable	840335
21.	Reflective opto cable	840378
22.	Extension cable 1500	840691
23.	PHOTO-PHOTAMP cable	840646
24.	Thermistor cable 100	840790

Refer to next page for figure.

Konelab 20		**840600 p840607O**
3.	Opto cable 620	840302
5.	Heating cable	840335
6.	Reflective opto cable	840378
7.	Extension cable 600	840380
13.	Incubator	840612
15.	Frame, measurement channel	840615
28.	Cuvette arm	840634
38.	Measuring head	886060
46.	Stepper motor	570114
56.	PHOTO-PHOTAMP cable	840646
57.	Incubator heating cable	840866
58.	Thermistor cable 100	840790

Refer to page 4-36 for figure.

Konelab 30 & 20 XT		**841772 p841773C**
3.	Opto cable 620	840302
5.	Heating cable	840335
6.	Reflective opto cable	840378
7.	Extension cable 600	840380
13.	Incubator	840612
15.	Frame, measurement channel	840615
28.	Cuvette arm	840634
38.	Measuring head	886060
46.	Stepper motor	570116
56.	PHOTO-PHOTAMP cable	840646
57.	Incubator heating cable	N01124
58.	Thermistor cable 100	840790

Refer to page 4-37 for figure.

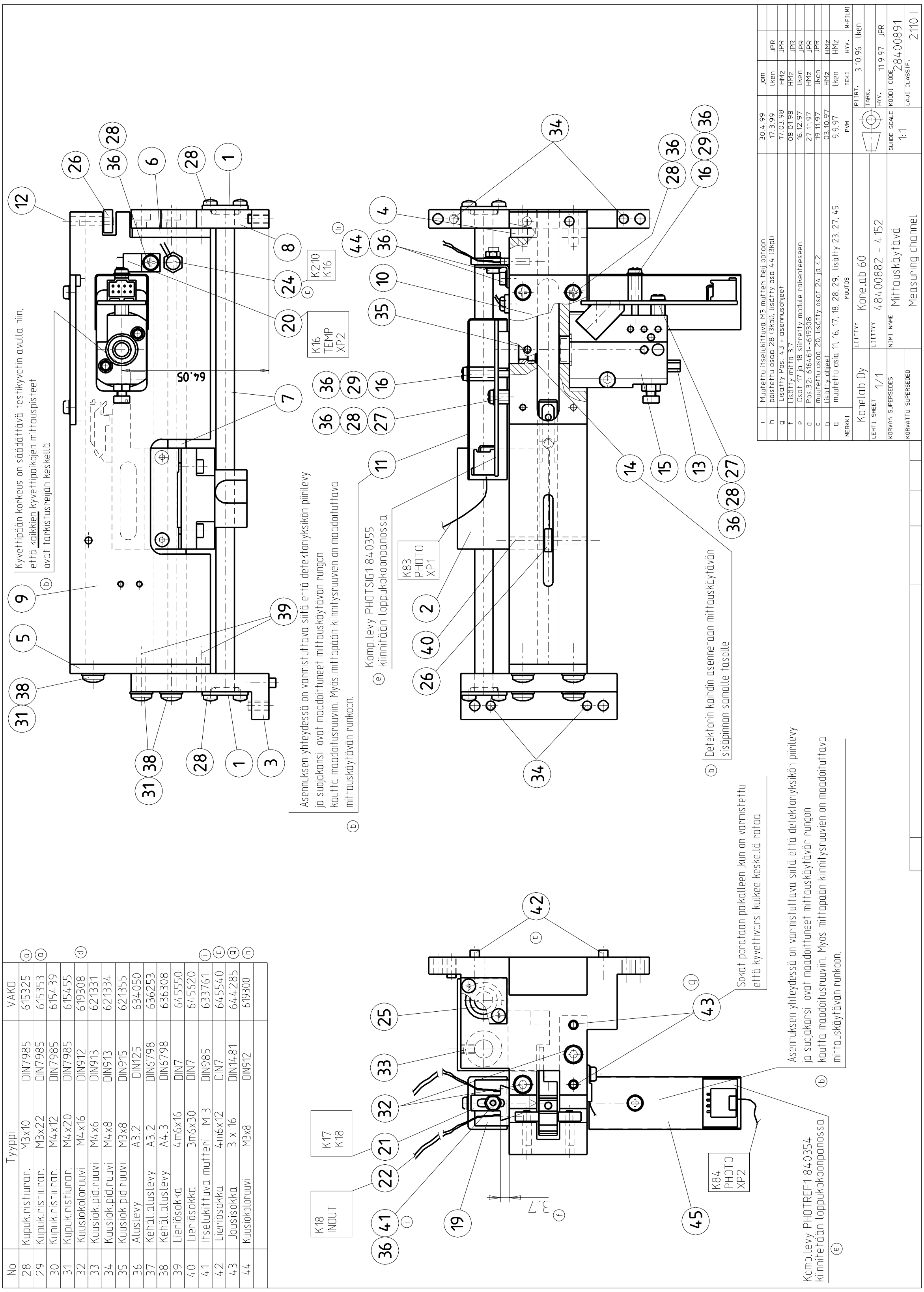


Figure 4-22 Konelab 60: Measuring channel 840088

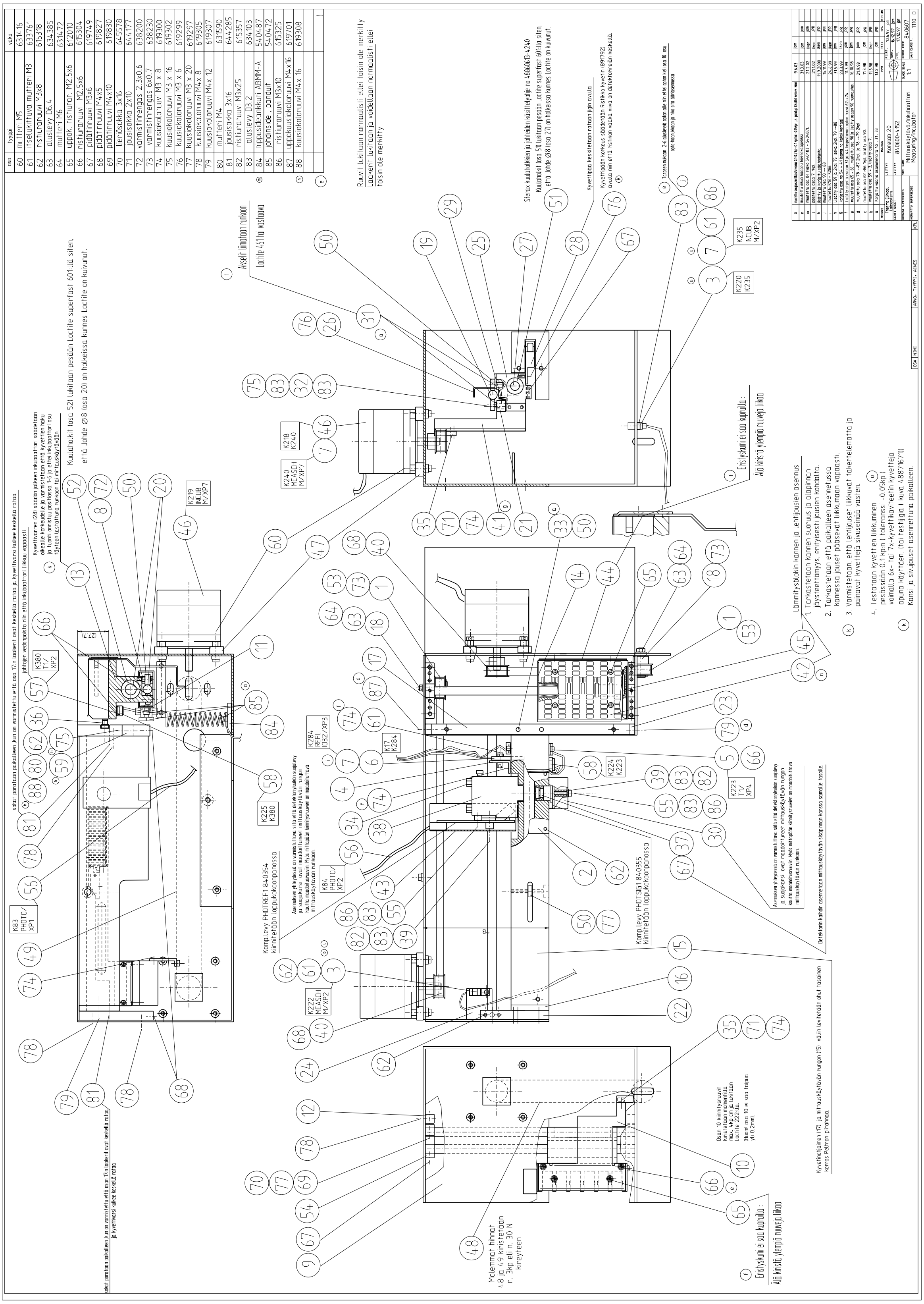


Figure 4-23 Konelab 20: Measuring channel 840600

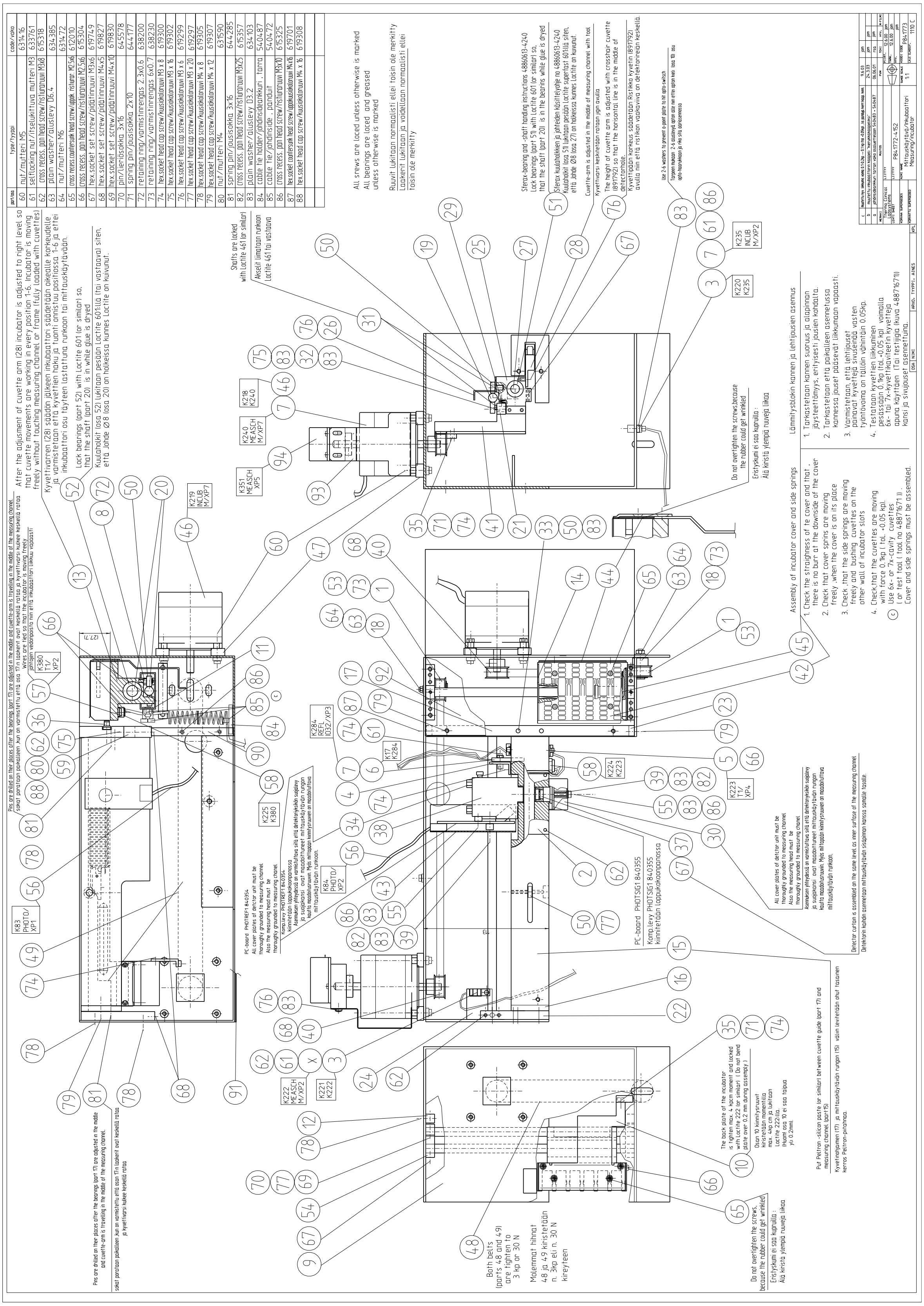


Figure 4-24 Konelab 30 & 20 XT: Measuring channel 841772

4.7.2.1 Measuring Head

Konelab 60 & 30 & 20		**886060 p886064F**
13.	Beam splitter	512709
18.	Biconvex lens	512712

Refer to next page for figure.

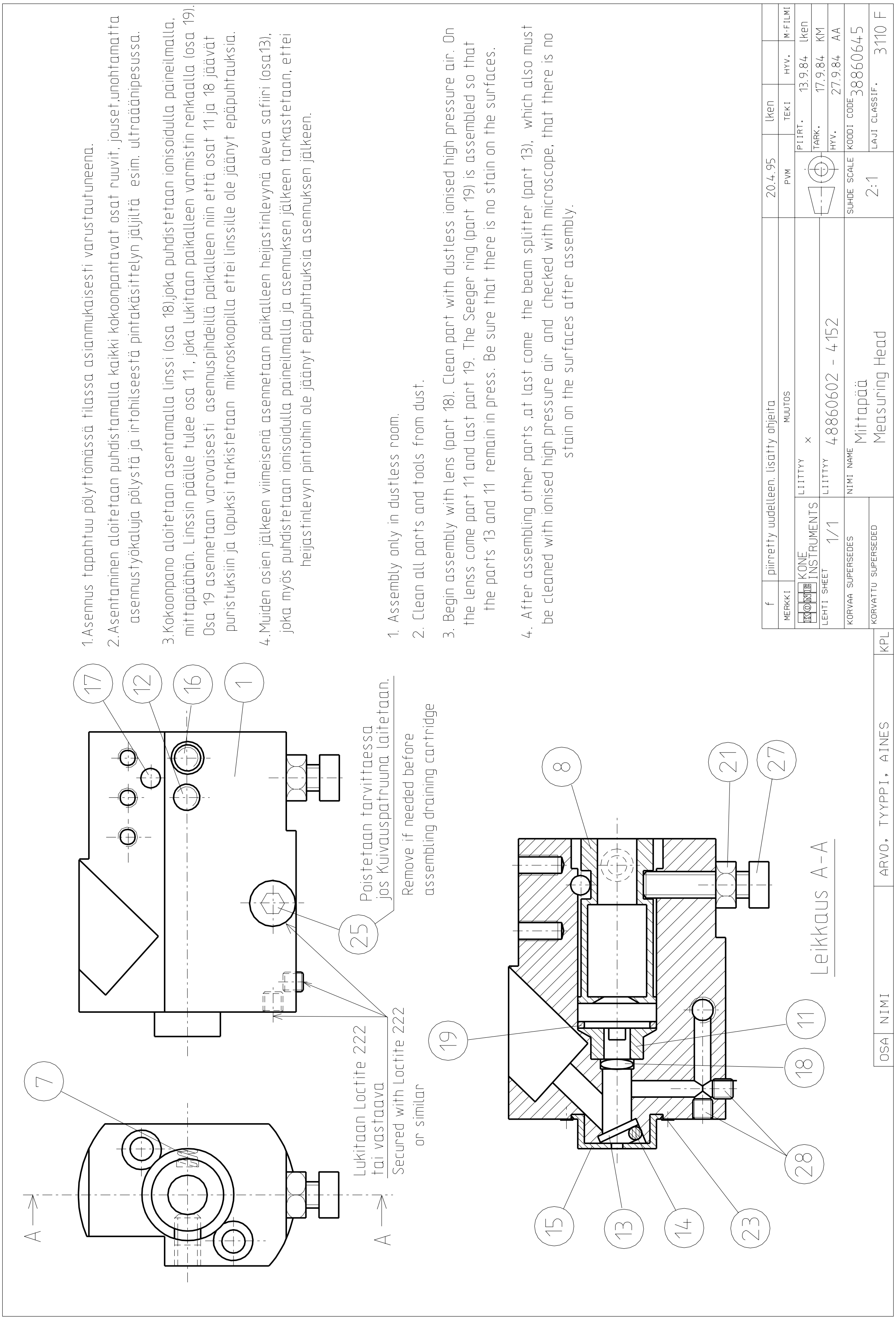


Figure 4-25 Konelab 60 & 30 & 20: Measuring head 886060

4.8 Lamp House

Konelab 60 & 30 & 20		840120 p840121J
6.	Condenser	884323
8.	Chopper motor+cable	840460
10.	Lamp connector cable	888822
16.	Filter wheel	840112
20.	Lamp 6 V 20 W	830609
22.	Opto cable 620	840302
27.	Wide gap opto cable 620	840417
47.	Extension cable 600	840380

Refer to next page for figure.

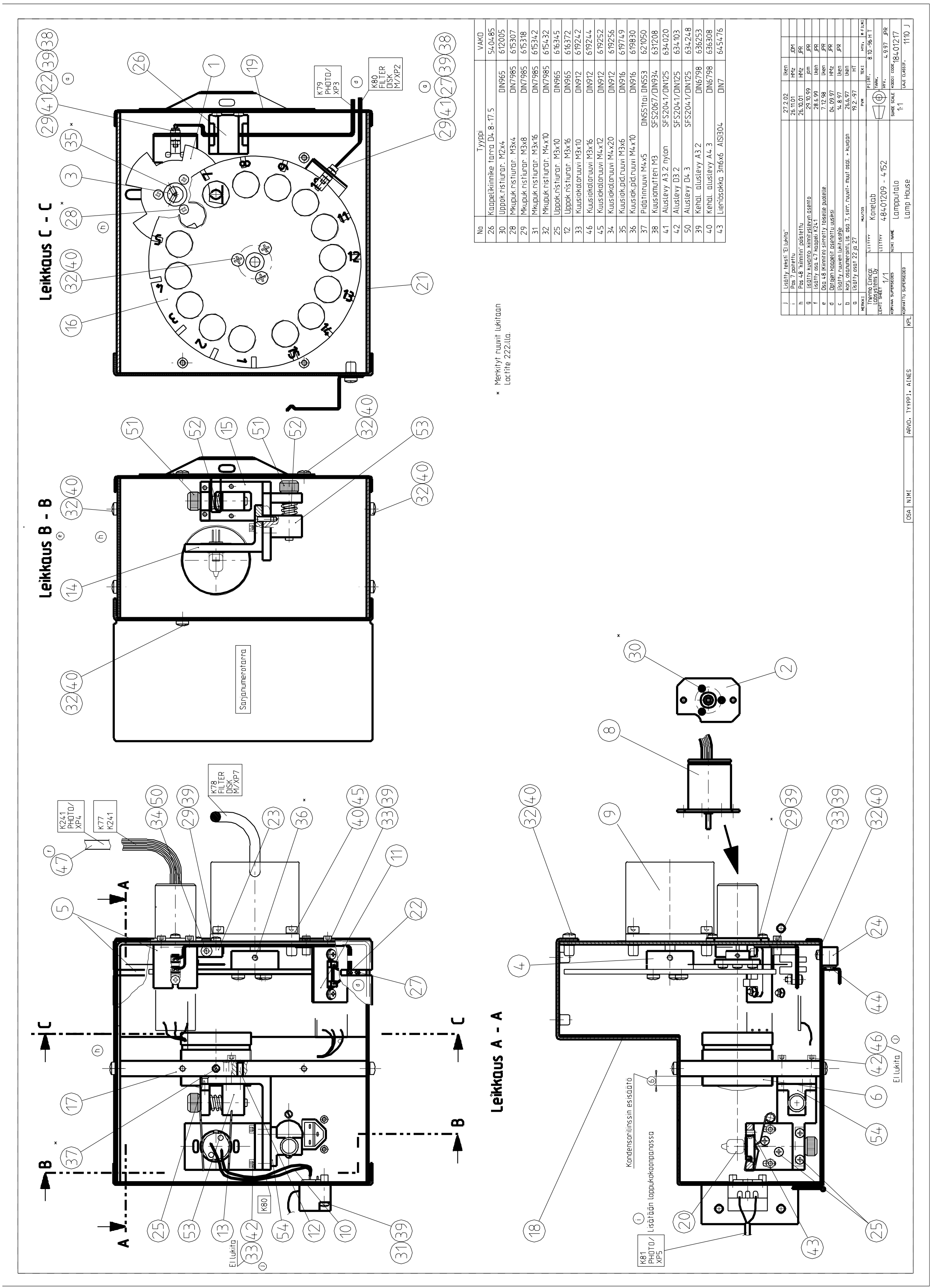


Figure 4-26 Konelab 60 & 30 & 20: Lamp house 840120

4.9 Reagent Storage

Konelab 60 & 30		**840173 p840174J**
1.	Cooling handle	830761
5.	Heat exchange piece	840177
9.	Silicon tube	733262
10.	Window for barcode reader	840269
11.	Brushless DC Fan 24 V	570264
12.	Opto cable 620	840302
14.	Extension cable 600	840380
15.	Peltier and thermistor cables	840629
16.	Cooling jacket	840176

Refer to next page for figure.

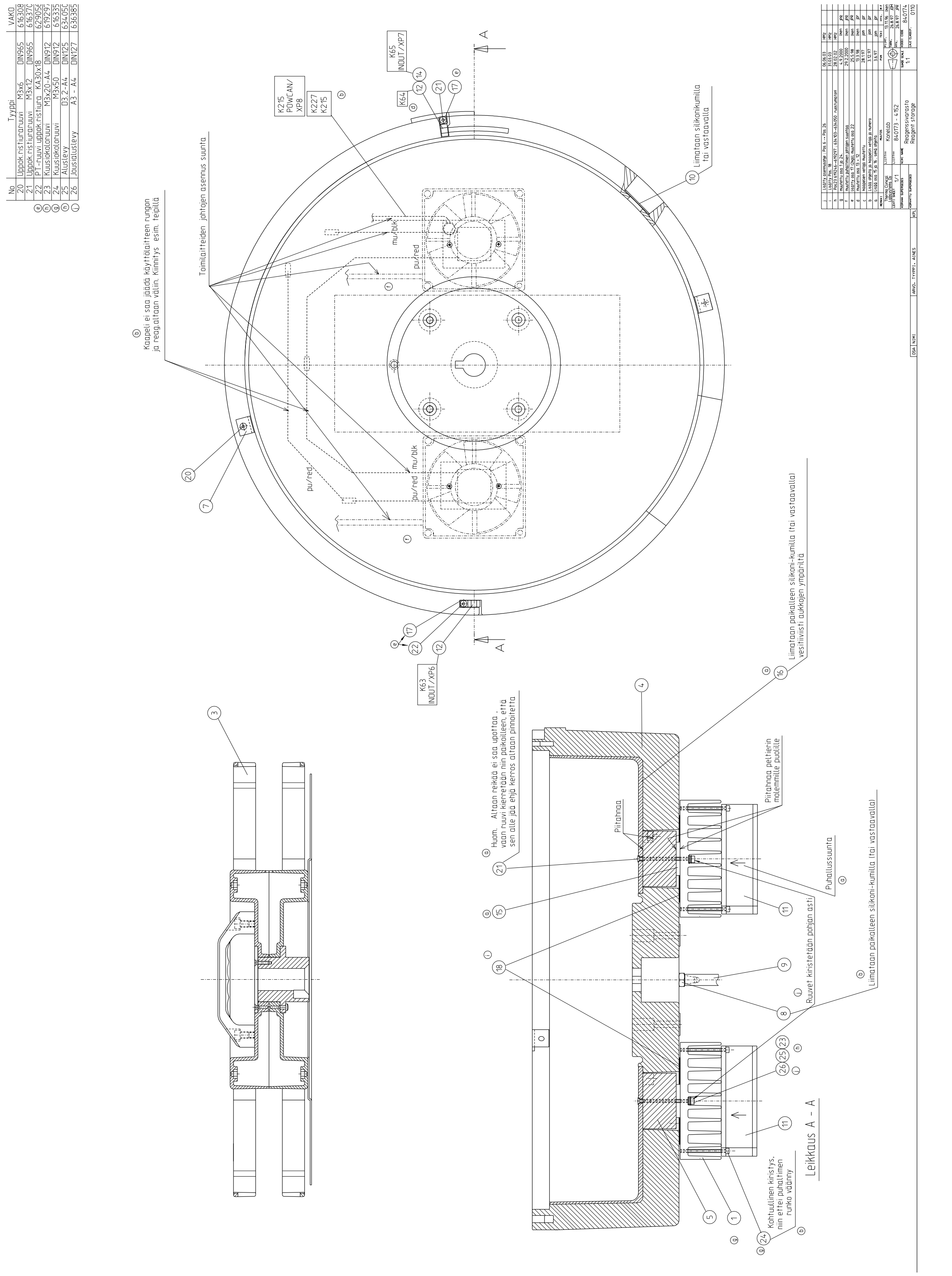


Figure 4-27 Konelab 60 & 30: Reagent storage 840173

4.10 Sample Storage

Konelab 60 & 30		840184 p840185J
1.	Cooling handle	830761
2.	Basin 40185	840123
4.	Heat exchange piece	840182
8.	Opto cable 620	840302
9.	Peltier and thermistor cables	840705
11.	Brushless DC Fan 24 V	570264
16.	Silicon tube	733262

Refer to next page for figure.

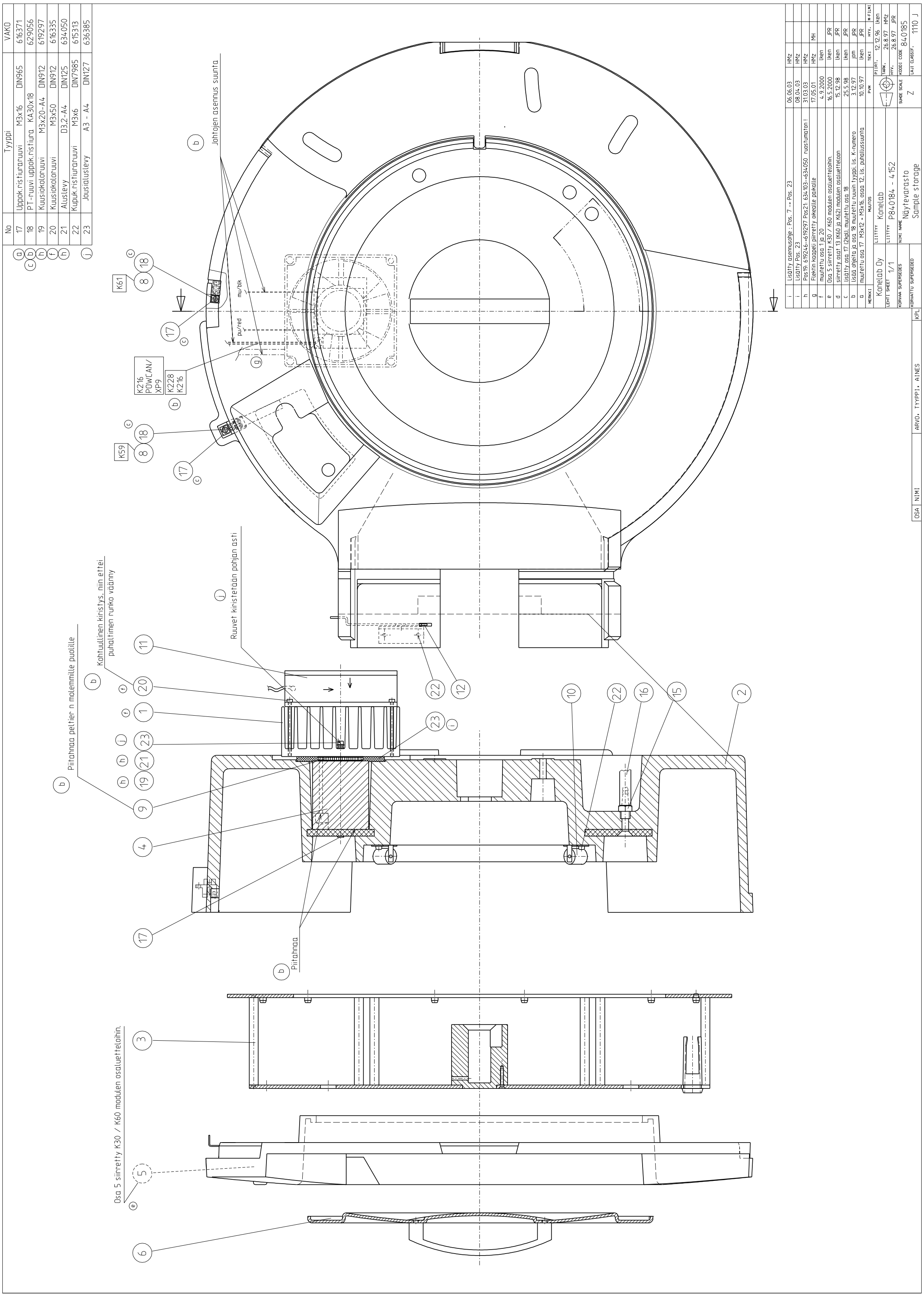


Figure 4-28 Konelab 60 & 30: Sample storage 840184

4.10.1 Segment Loader

Konelab 60 & 30	**840024** **p840025E**

Refer to next page for figure.

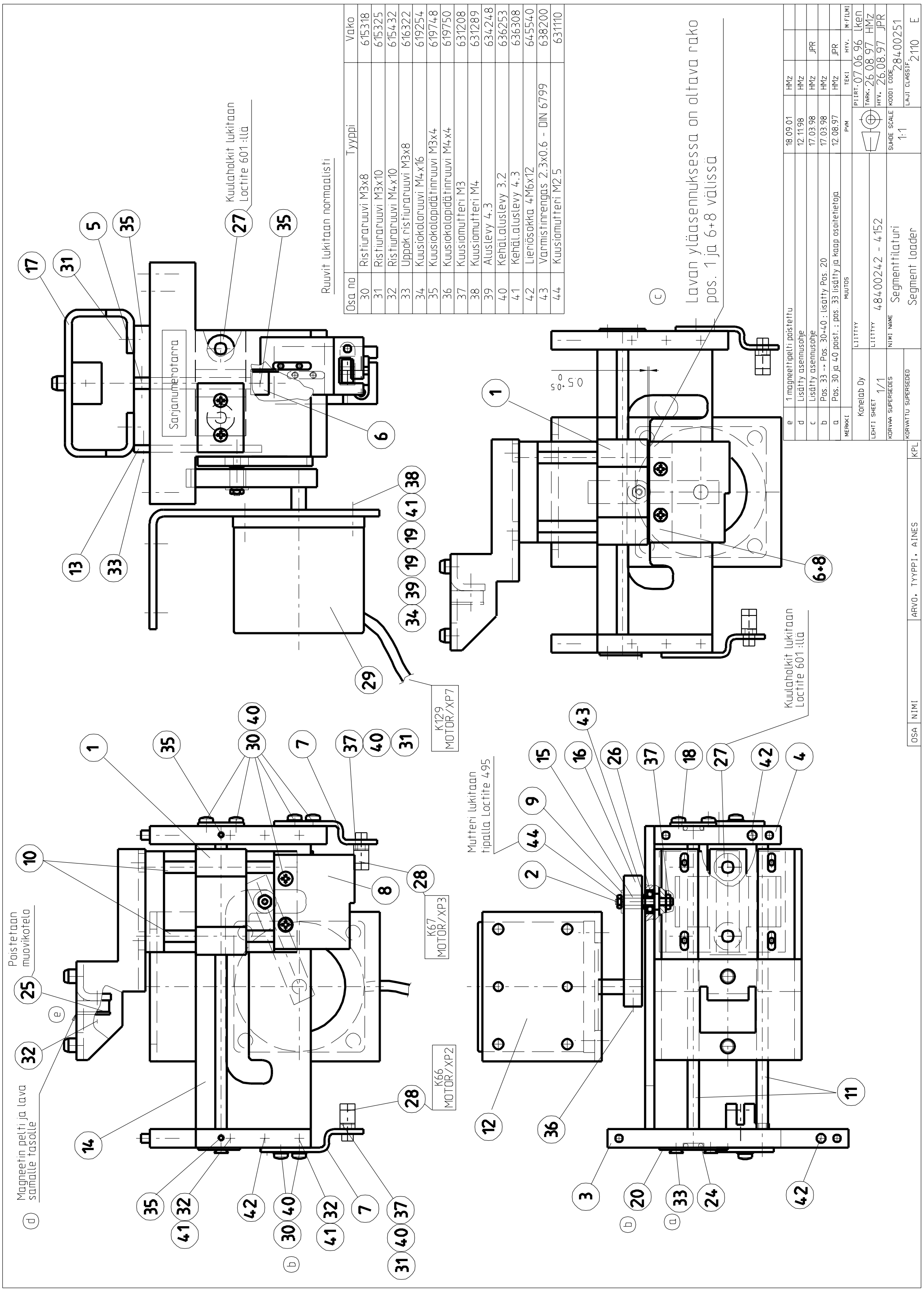


Figure 4-29 Konelab 60 & 30: Segment loader 840024

4.11 Sample & Reagent Basin

Konelab 20		841521 p841522E
1.	Cooling plate	841383
5.	Sample/ Reagent fans cable	841532

Refer to next page for figure.

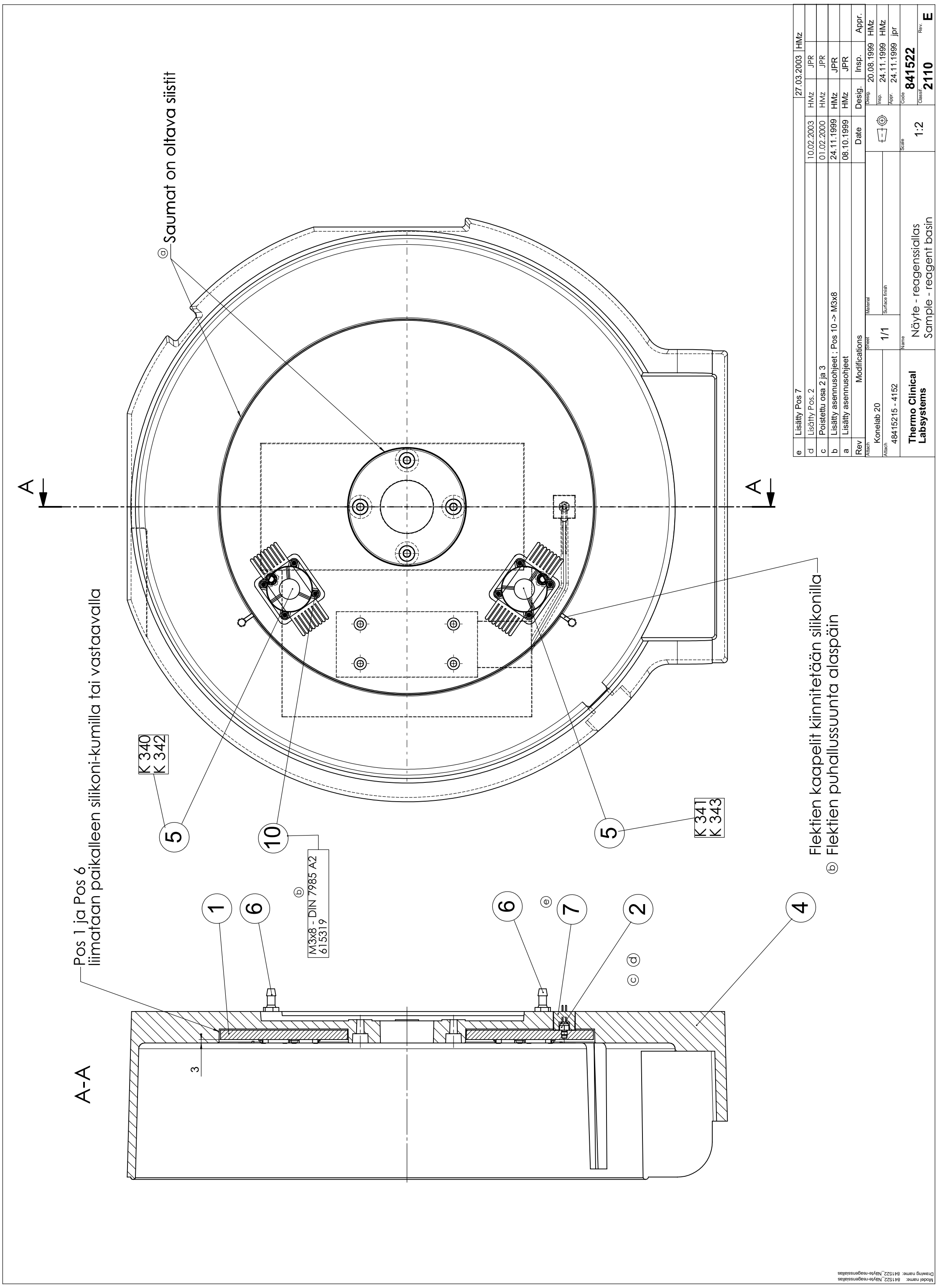


Figure 4-30 Konelab 20: Sample & Reagent basin 841521

4.11.1 Reagent Cooling Unit

Konelab 20	841489 p841661B

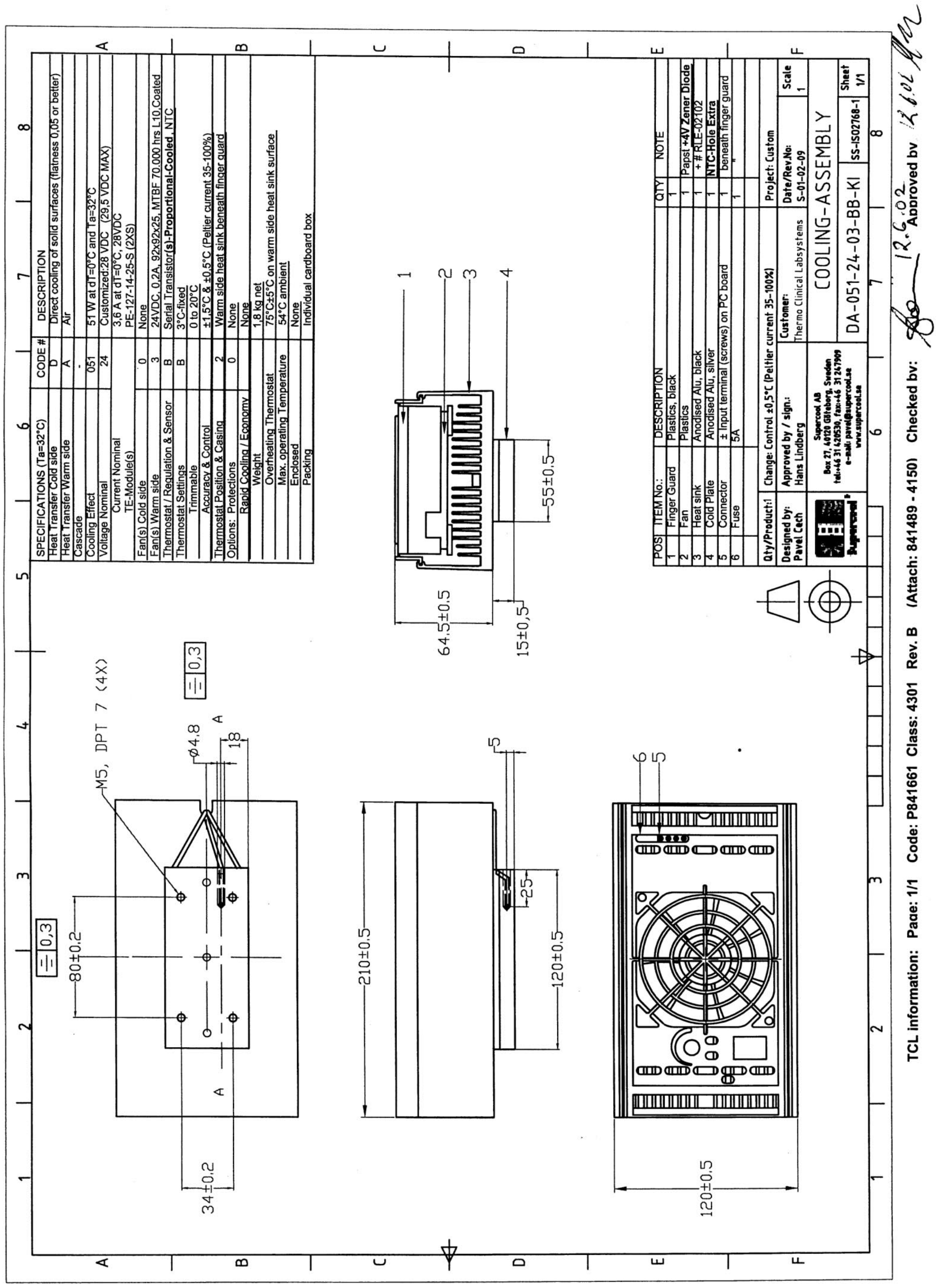
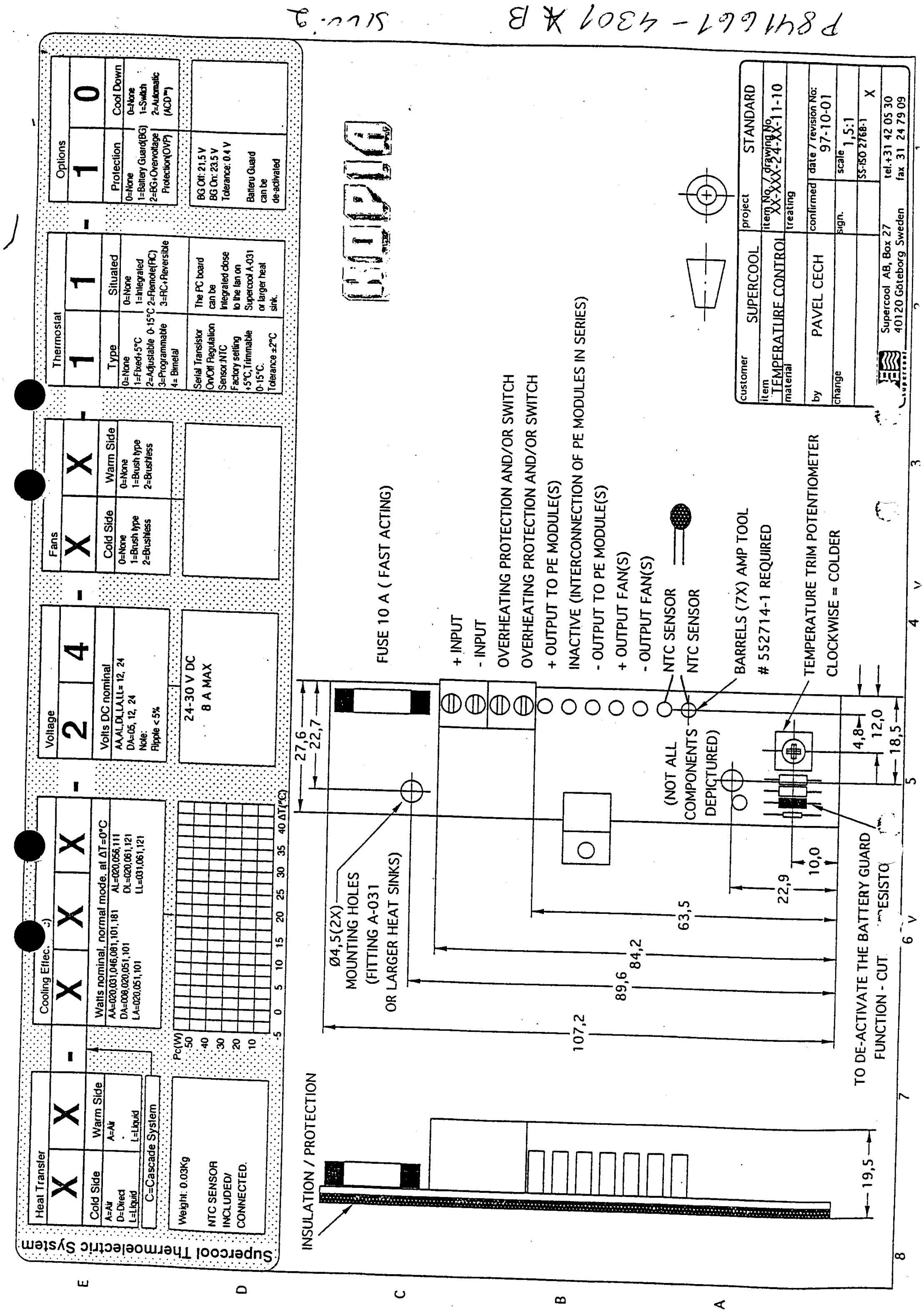


Figure 4-31 Konelab 20: Reagent cooling unit 841489


P841661-4301 X B
Sivu 3
Heat Transfer
X
Cold Side
A=Air
D=Direct
L=Liquid
X
Warm Side
A=Air
L=Liquid
C=Cascade System
Cooling Effect
X X X
Watts nominal, normal mode, at ΔT=0°C
Voltage
2 4
Volts DC nominal
24-30 V DC
8 A MAX
Fans
X
Cold Side
0=None
1=Brush type
2=Brushless
X
Warm Side
0=None
1=Brush type
2=Brushless
Thermostat
1
Type
0=None
1=Fixed+5°C
2=Adjustable 0-15°C
3=Programmable
4= Bimetal
1
Situated
0=None
1=Integrated
2=Remote(RC)
3=RC+Reversible
Options
1
Protection
0=None
1=Battery Guard(BG)
2=BG+Overvoltage Protection(OVP)
0
Cool Down
0=None
1=Switch
2=Automatic (ACD™)
BG Off: 21,5 V
BG On: 23,5 V
Tolerance: 0,4 V
Battery Guard can be de-activated
Weight: 0.03Kg
NTC SENSOR INCLUDED/ CONNECTED.
Supercool Thermoelectric System
FUSE 10 A (FAST ACTING)
+ INPUT
- INPUT
OVERHEATING PROTECTION AND/OR SWITCH
OVERHEATING PROTECTION AND/OR SWITCH
+ OUTPUT TO PE MODULE(S)
INACTIVE (INTERCONNECTION OF PE MODULES IN SERIES)
- OUTPUT TO PE MODULE(S)
+ OUTPUT FAN(S)
- OUTPUT FAN(S)
NTC SENSOR
NTC SENSOR
BARRELS (7X) AMP TOOL
552714-1 REQUIRED
TEMPERATURE TRIM POTENTIOMETER
CLOCKWISE = COLDER
(NOT ALL COMPONENTS DEPICTURED)
Ø4,5(2X) MOUNTING HOLES
(FITTING A-031
OR LARGER HEAT SINKS)
INSULATION / PROTECTION
TO DE-ACTIVATE THE BATTERY GUARD FUNCTION - CUT
27,6
22,7
107,2
89,6
84,2
63,5
22,9
10,0
4,8
12,0
18,5
19,5
customer SUPERCOOL
project STANDARD
item TEMPERATURE CONTROL
item No. / drawing No. XX-XXX-24-XX-11-10
by PAVEL CECH
date / revision No: 97-10-01
scale 1,5:1
Supercool AB, Box 27
40120 Göteborg Sweden
tel.+31 42 05 30
fax 31 24 79 09

4.12 Syringe Unit

Konelab 60 & 30		**840133** **p840134D**
2.	Stepper motor + cable	840674
22.	Opto cable 620	840302

Refer to next page for figure.

Konelab 20	**841459**
Syringe motor and cable	**p841472A**
Syringe opto cable	**p841501B**
Syringe front plate	**p841502**

Refer to page 4-54, page 4-55 and page 4-56 for figures.

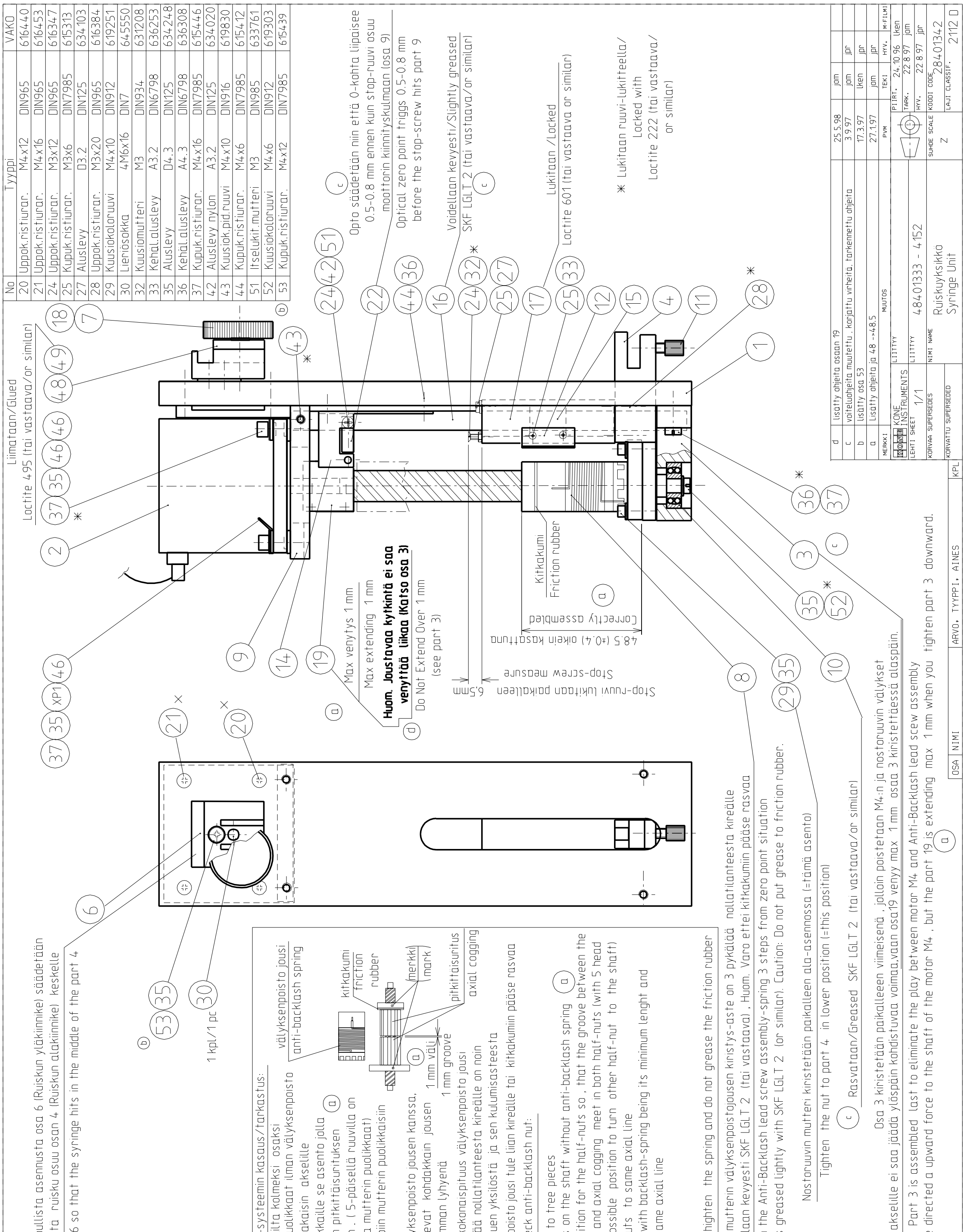
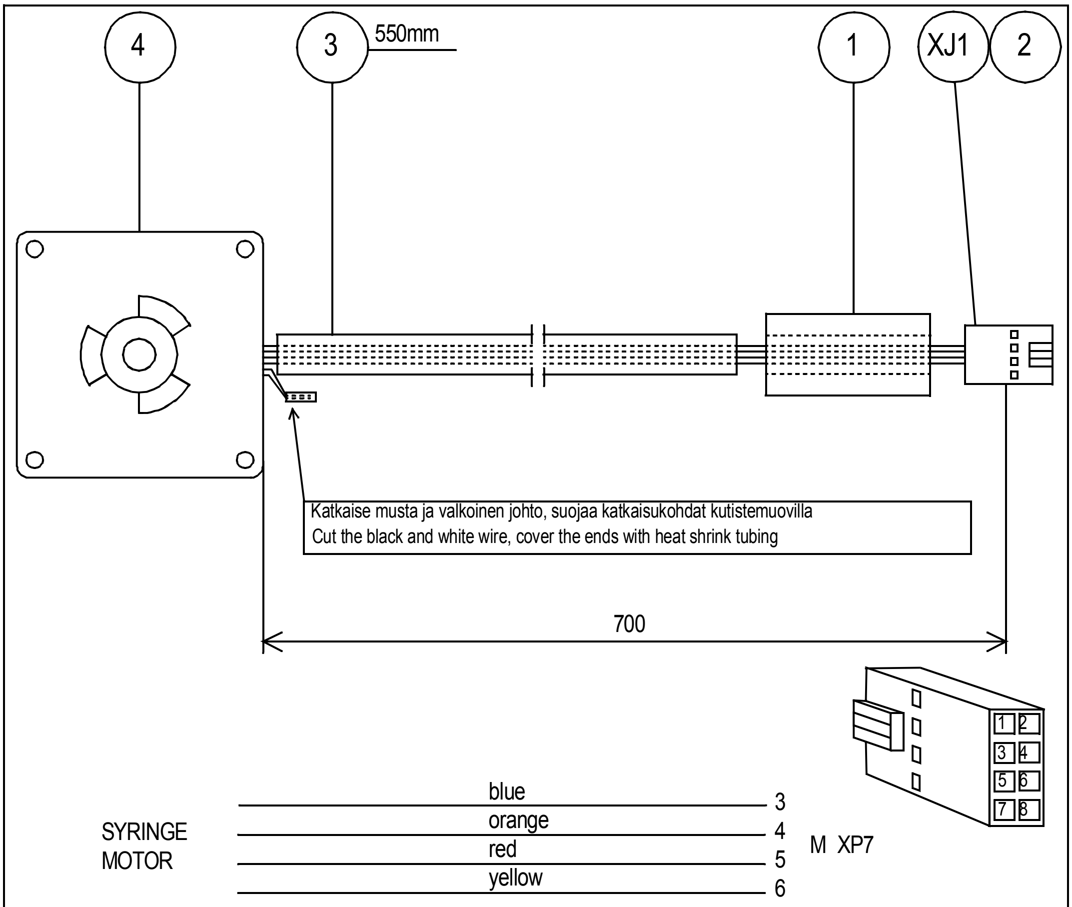


Figure 4-32 Konelab 60 & 30: Syringe unit 840133



Johdot t„ytyy jatkaa saman v„risill„ johdoilla !

Wires must be extended using wires of the same colors !

XJ1	crimp connector housing CGrid III dual row	Molex	90142	8s	90142-008
1	EMI -ferrite	Steward	28B0562-200		28B0562-200
		Kitagawa	RI 14-28-6		RI 14-28-6
2	terminal CGrid III female crimp	Molex 90119	AWG22-24 90119-2110		
3	cable sleeve	D7mm lenght 550mm			
4	motor	Step-Syn TYPE 103-540-26 DC 4V 0,6A 1,8DEG/STEP			

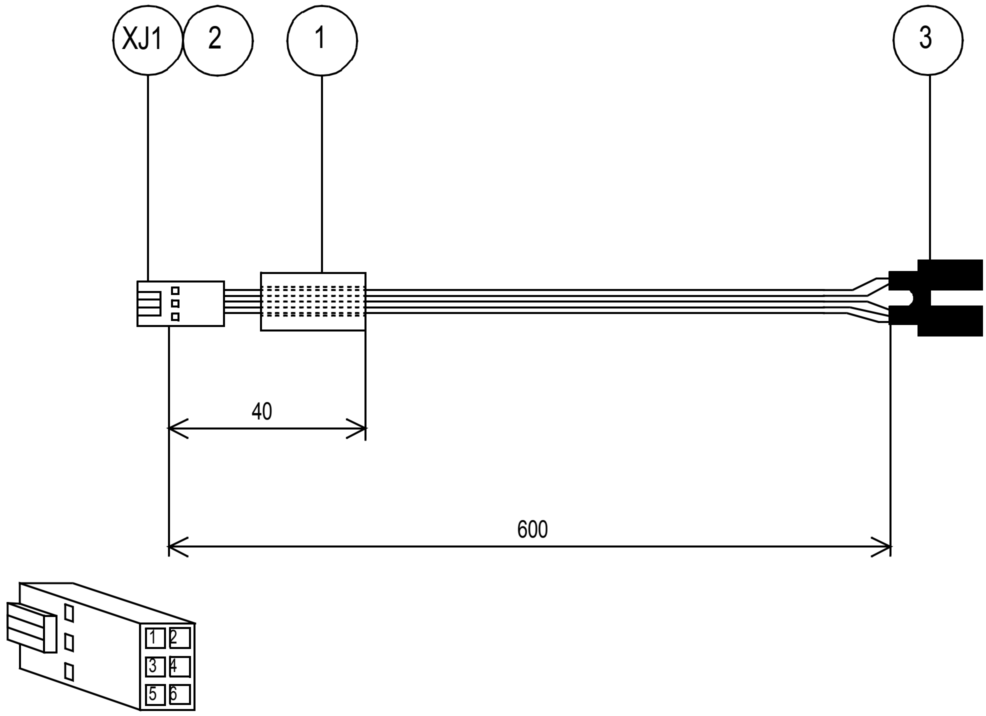
MERKKI MARK	MUUTOS REVISIONS	PVM DATE	TEKI DRAWN	HYV. APPR.	M-FILMI M-FILM
a	Kytkent„ korjattu, l is„tty ohje. Connection corrected, note added.	12.10.99	JHen	JN	

123Konelab	LIITTYY ASSOCIATES: Konelab	PIIRT. DRAWN	05.08.99 JHen
LEHTI SHEET: 1/1	LIITTYY ASSOCIATES: (841459)	TARK. CHECKED	05.08.99 JHen
		HYV. APPR.	05.08.99 JPR
KORVATTU REPLACED	NIMI NAME: RUISKUN MOOTTORI + kaapeli / SYRINGE MOTOR + cable	SUHDE SCALE: Z	KOODI CODE: 48414720
KORVAA REPLACES			LAJI CLASSIF.: 4112 A

Figure 4-33 Konelab 20: Syringe motor and cable 841459

Johtimet kierret„„n tai palmikoidaan l”ys„sti ennen liittimen laittamista!

Wires must be twisted or plaited together slackly before putting the connector housing!



M XP2	1	red	SYRINGE MOTOR OPTO
	2	black	
	3	white	
	4	green	
	5	blue	

XJ1 crimp connector housing CGrid III dual row	Molex 90142 6 s		90142-006
1 EMI ferrite	Steward 28B0375-300		28B0375-300
	Kitagawa RI 11-18-5		RI 11-18-5
2 terminal CGrid III female crimp	Molex 90119 AWG	26-28	90119-2121 loose
			90119-0121 reel
			90119-2122 loose
			90119-0122 reel
3 optical switch Optek OPB943W51 OPB943W51			

MERKKI MARK	MUUTOS REVISIONS	PVM DATE	TEKI DRAWN	HYV. APPR.	M-FILMI M-FILM
b	Jatkojohdot poistettu. Extension wires removed.	08.11.99	JHen		
a	Lis„tty ohje jatkojohdoista. Instruction added for extension wires.	12.10.99	JHen	JN	

123Konelab	LIITTYY ASSOCIATES Konelab	PIIRT. DRAWN	05.08.99 JHen
LEHTI SHEET 1/1	LIITTYY ASSOCIATES (841459)	TARK CHECKED	05.08.99 JHen
		HYV. APPR.	05.08.99 JPR
KORVATTU REPLACED	NIMI NAME Ruiskun optokaapeli Syringe optocable	SUHDE SCALE Z	KOODI CODE 48415013
KORVAA REPLACES			LAJI CLASSIF. 4112 B

Figure 4-34 Konelab 20: Syringe opto cable (841459)

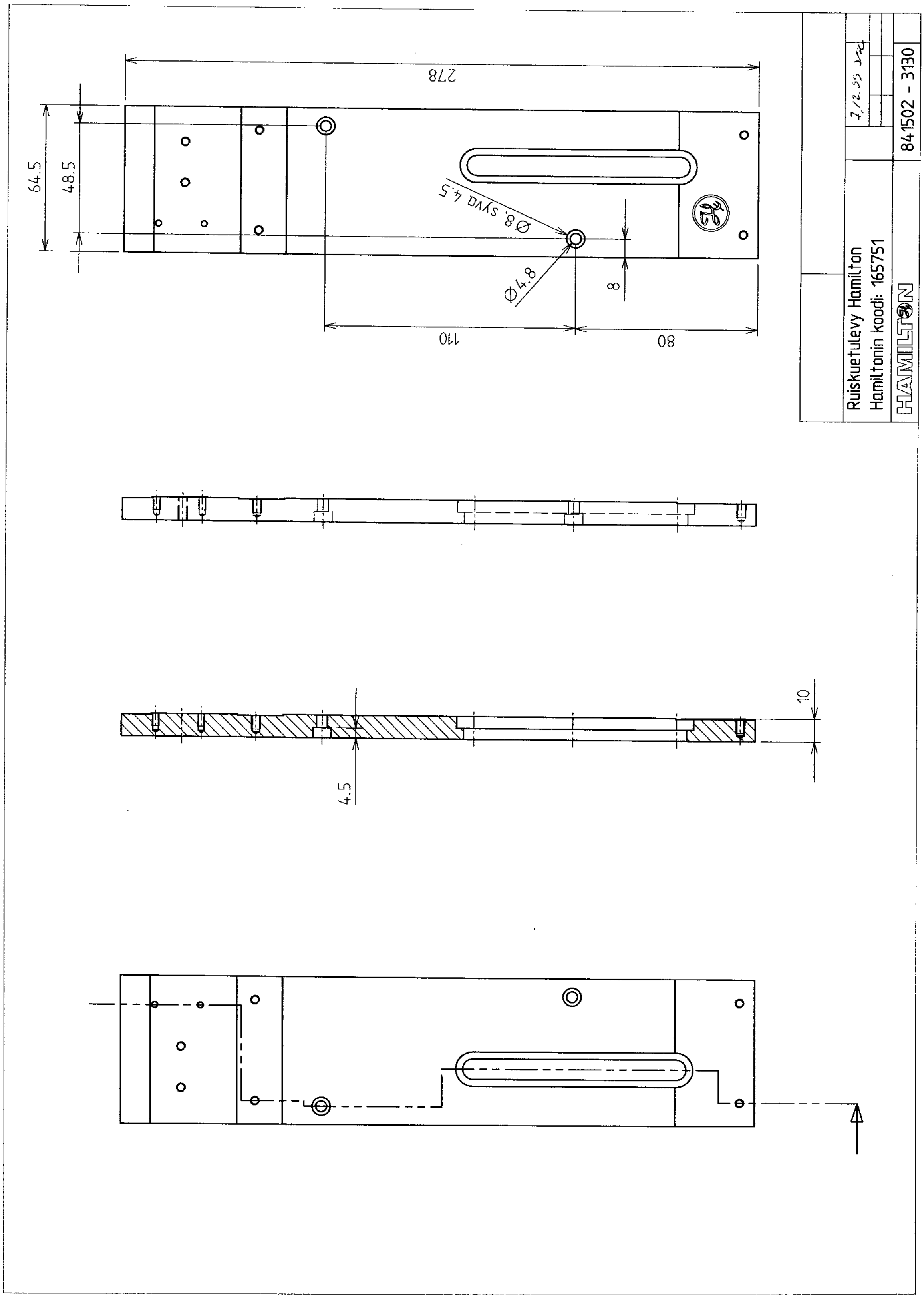


Figure 4-35 Konelab 20: Syringe front plate 841459

4.13 Tubings

Konelab 60	**p841245**
Assembly instruction II	E-version

Refer to next page for figure.

Konelab 30	**p841246**
Assembly instruction II	E-version

Refer to page 4-56 for figure.

Konelab 20	**p841433**
Assembly instruction	E-version

Refer to page 4-57 for figure.

Konelab 20 XT	**p842053**
Assembly instruction	B-version

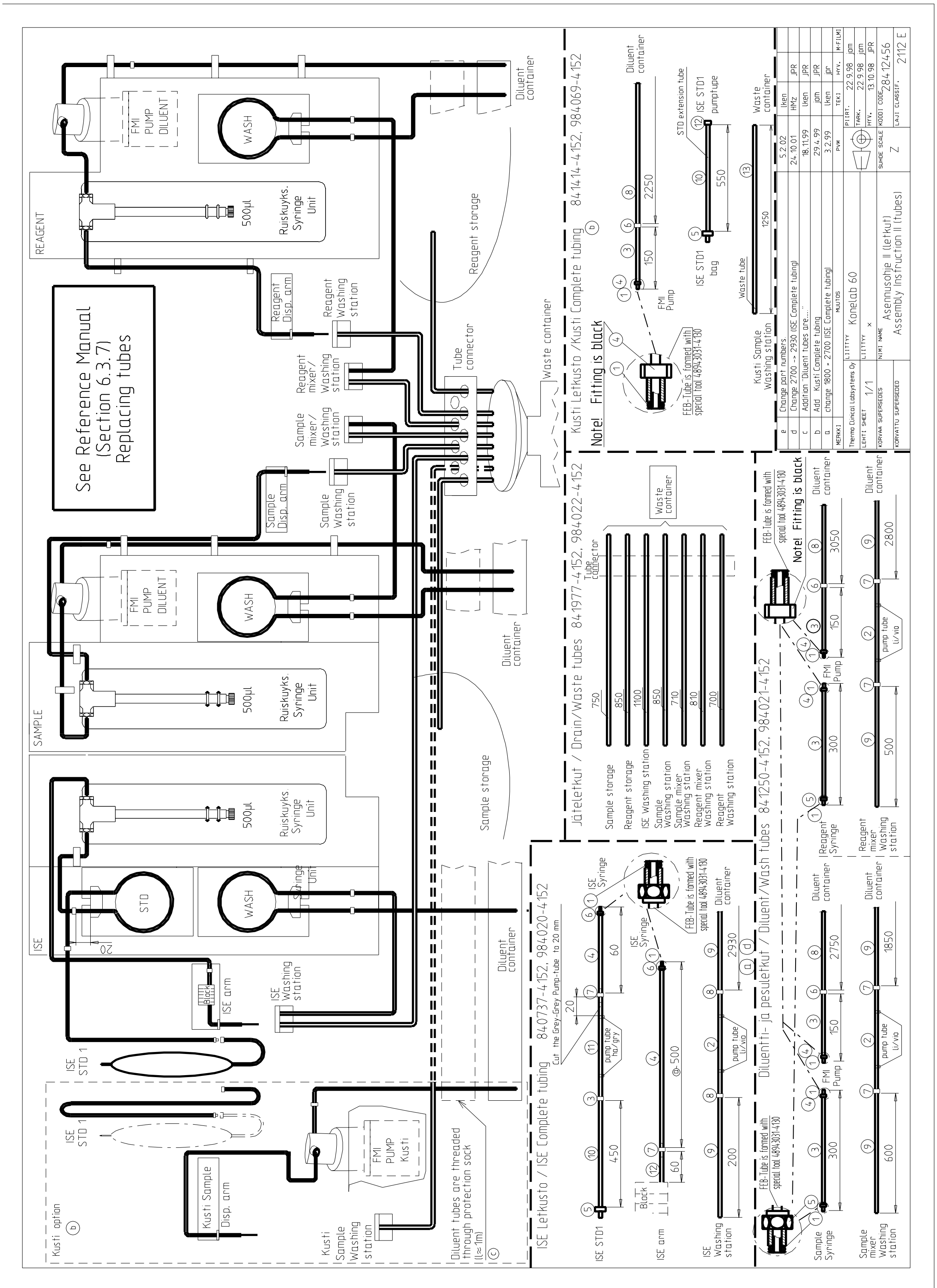


Figure 4-36 Konelab 60: Assembly instruction II p841245

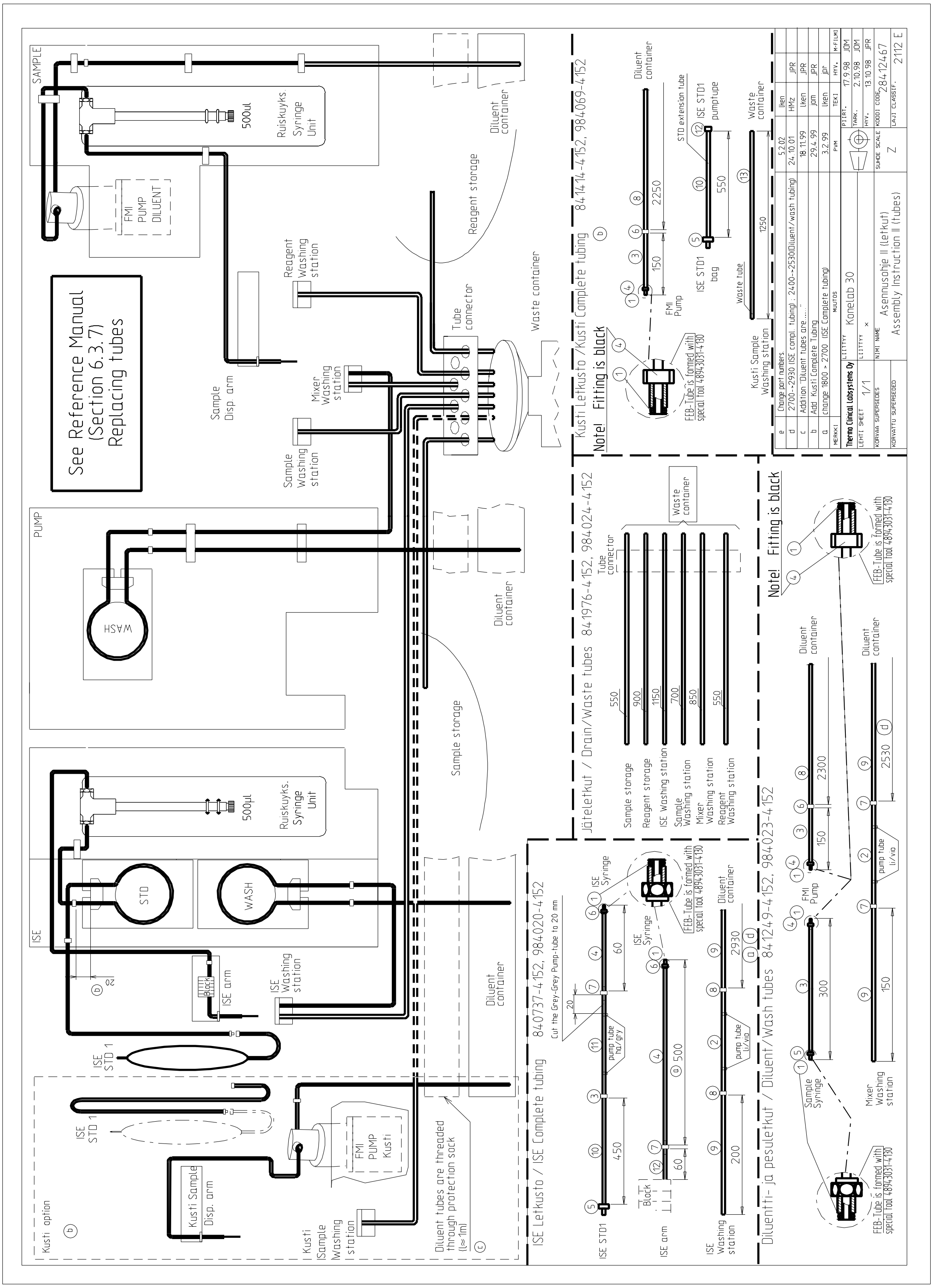


Figure 4-37 Konelab 30: Assembly instruction II p841246

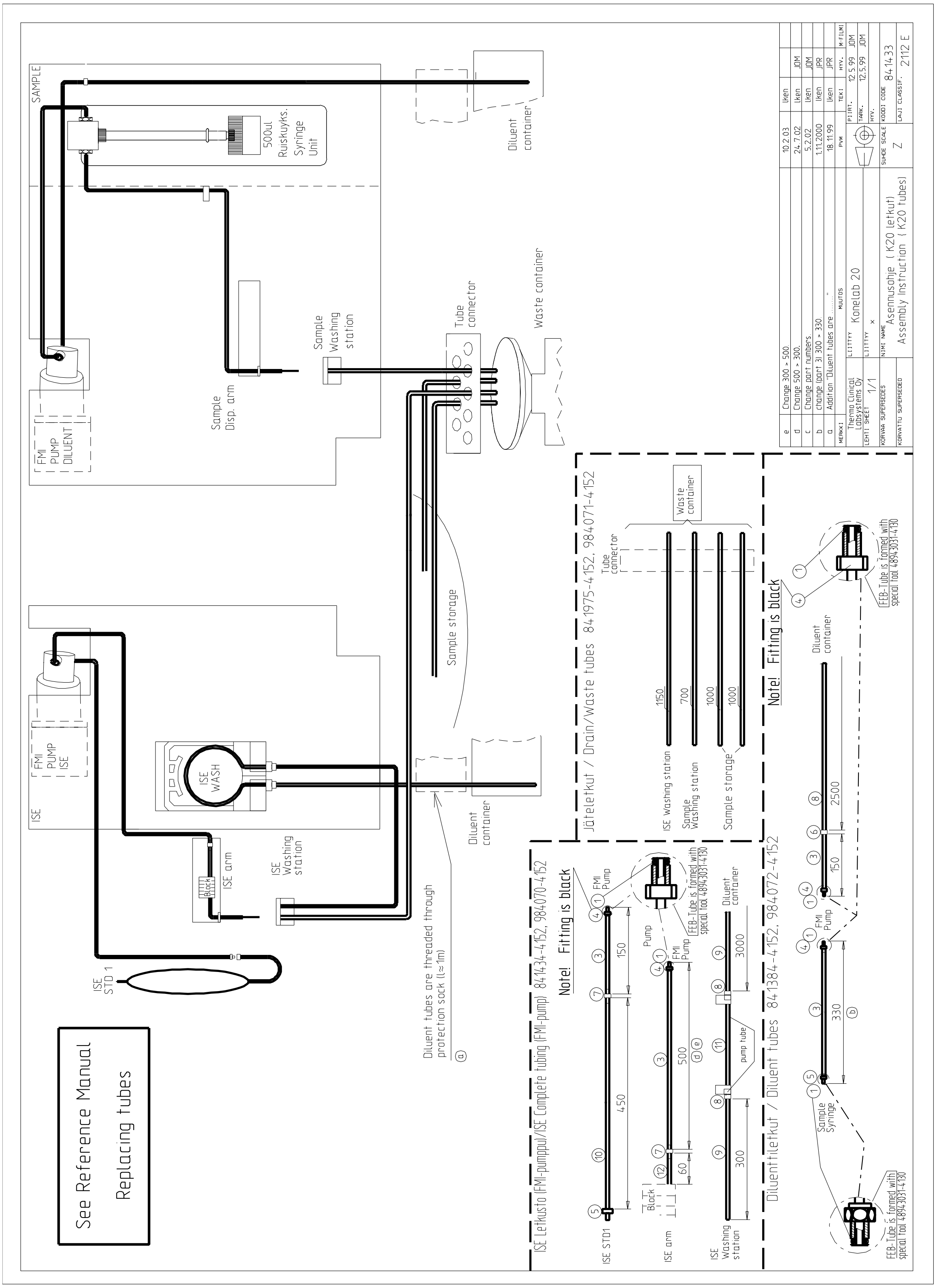


Figure 4-38 Konelab 20: Assembly instruction p841433

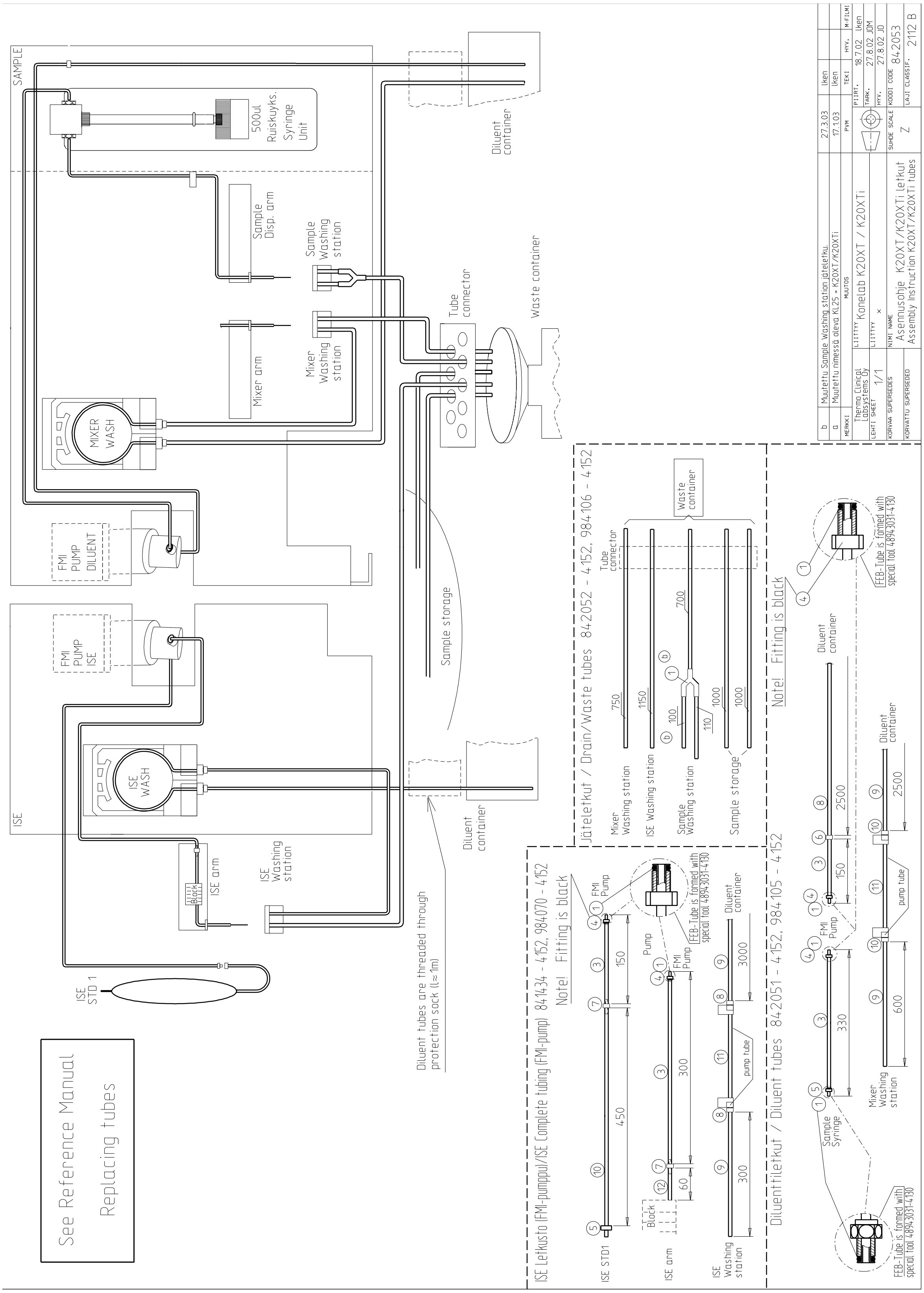


Figure 4-39 Konelab 20 XT: Assembly instruction p842053

Section 5 Maintenance

Use lubrication oil silicon (752312) for segment loader, lower rail of incubator in Konelab 30 and 30i. Silicon paste (840202) for peltiers and thermistors. Lithium grease (981614) for motor units, Kerk screws in syringe, upper rail of incubator in Konelab 30 and 30i.

5.1 LUBRICATION

1. Conductors and ball barrels

Conductors and ball barrels are cleaned from preserving oil before lubrication. For cleaning you can use Solmaster cleaner for electronics SA5.

For lubrication use Lithium soap/di-ester-oil -based lubricant SKF LGLT 2 or corresponding.

2. KERK movement screws, e.g. in syringe

For lubrication use Lithium soap/di-ester-oil -based lubricant SKF LGLT 2 or corresponding.

3. Bearings

For lubrication use Lithium soap/di-ester-oil -based lubricant SKF LGLT 2 or corresponding.

4. To better thermal contact in peltiers, thermistors

Silicon paste (ordering code 840202) is used to better thermal contact, Peltron PKE 36 G 007 or corresponding.

5. Screw locker

Loctite 222 or corresponding is used as screw locker if extra strong fastening is needed Loctite 242 or corresponding is used.

6. Bearings locker

Loctite 641 or corresponding is used as bearings locker if extra strong fastening is needed Loctite 601 or corresponding is used.

7. General glue

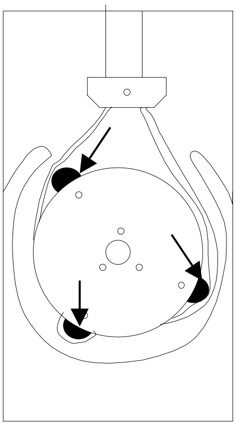
Loctite 495 or corresponding is used for gluing.

8. General lubrication

VISO TRI-FLOW 990 A or corresponding can be used for general lubrication unless other is mentioned.

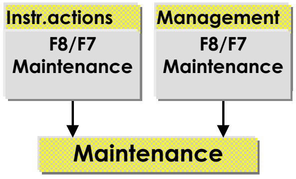
5.1.1 GREASING OF PUMP ROLLERS

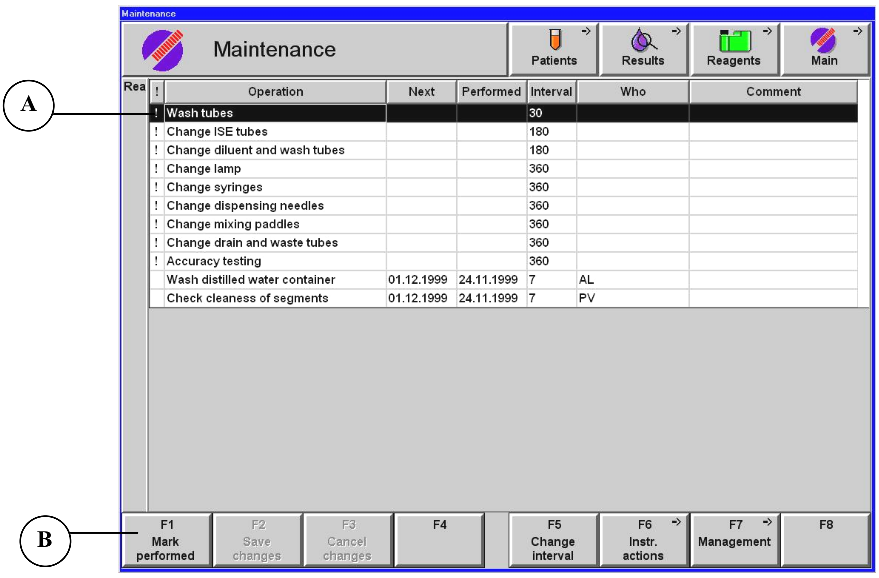
If pumps are noisy the greasing of pump rollers with Lithium soap/di-ester-oil -based lubricant SKF LGLT 2 or corresponding can help.



☞ Put grease between the plate and rollers.

5.2 MAINTENANCE WINDOW





The Maintenance window is provided with the checking table of the maintenance procedures. The maintenance operations are seen in the order of urgency.

Information seen in the Maintenance window:

- *!*	The exclamation mark reminds that the time to perform the maintenance task is already over.
- *Operation*	Description of the maintenance task to be done.
- *Next*	The date for the next maintenance operation.
- *Performed*	The date when operation has been performed.
- *Interval*	The interval of the operation in days.
- *Who*	The name of the person who performed the task.
- *Comment*	Any comment concerning operation.

A

Select the maintenance operation.

B

Activate F1 to mark the task performed. Give your name and any comment concerning the operation. The date performed and the date for the next operation are updated automatically.

☞ Save changes with F2. With F3 you can cancel the changes made after the last save.

To change the interval

☞ Select F5 to change the interval of the maintenance operation. The interval is given as days. You can give * if you want that the operation is not followed, e.g. accuracy testing.

5.3 MAINTENANCE KITS

984036	**6 MONTHS MAINTENANCE KIT FOR KONELAB 20 AND 20i**	
984072	Diluent and wash tubes	1 pc
981481	Halogen lamp	1 pc
984004	**6 MONTHS MAINTENANCE KIT FOR KONELAB 30 AND 30i**	
984023	Diluent and wash tubes	1 pc
981481	Halogen lamp	1 pc
984007	**6 MONTHS MAINTENANCE KIT FOR KONELAB 60 AND 60i**	
984021	Diluent and wash tubes	1 pc
981481	Halogen lamp	1 pc
984028	**6 MONTHS ISE Complete tubing for Konelab 20i**	
984070	ISE Tubing kit	1 pc
984115	**6 MONTHS MAINTENANCE KIT FOR KONELAB 20XT AND 20XTi**	
984105	Diluent tubes	1 pc
981481	Halogen lamp	1 pc
984020	**6 MONTHS ISE Complete tubing for Konelab 30i and 60i**	
984037	**12 MONTHS MAINTENANCE KIT FOR KONELAB 20 AND 20i**	
984015	Syringe 500 µl grip fix	1 pc
984010	Dispensing needle (reagent & sample)	1 pc
984072	Diluent and wash tubes	1 pc
984071	Drain/ waste tubes	1 pc
981481	Halogen lamp	1 pc
840551	Dispenser ground wire 500	1 pc
984114	**12 MONTHS MAINTENANCE KIT FOR KONELAB 20XT AND 20XTi**	
984105	Diluent tubes	1 pc
984106	Drain and waste tubes	1 pc
984093	Dispensing needle	1 pc
984012	Mixing paddle	1 pc
981481	Halogen lamp	1 pc
840551	Ground wire 500	1 pc
N02135	Syringe 500 µl	1 pc
984008	**12 MONTHS MAINTENANCE KIT FOR KONELAB 30 AND 30i**	
981269	Syringe 500 µl	1 pc
984010	Dispensing needle (reagent & sample)	1 pc
984023	Diluent and wash tubes	1 pc
984022	Drain/waste tubes	1 pc
981481	Halogen lamp	1 pc
984012	Mixing paddle	1 pc
840551	Dispenser ground wire 500	1 pc

984005	**12 MONTHS MAINTENANCE KIT FOR KONELAB 60 AND 60i**	
981269	Syringe 500 µl	2 pcs
984010	Dispensing needle (reagent/sample)	2 pcs
984021	Diluent and wash tubes	1 pc
984022	Drain/waste tubes	1 pc
981481	Halogen lamp	1 pc
984012	Mixing paddle	2 pcs
840551	Dispenser ground wire 500	1 pc

984029	**12 MONTHS ISE DISPENSER KIT for Konelab 20i, 20XT**	
984070	ISE Complete tubing	1 pc
984011	Dispensing needle	1 pc
840551	Ground wire 500	1 pc

984006	**12 MONTHS ISE DISPENSER KIT for Konelab 30i and 60i**	
984020	ISE Complete tubing	1 pc
984011	Dispensing needle ISE	1 pc
981269	Syringe 500 µl	1 pc
980306	Pump tube	2 pcs
840551	Ground wire 500	1 pc

984076	**12 MONTHS MAINTENANCE KIT for KUSTI**	
984073	Dispensing needle	1 pc
984069	Tubing kit	1 pc
840551	Ground wire 500	1 pc

981577	**INSTRUMENT ACCURACY TESTING KIT**	
	Accuracy solution kit	1 pc
841214	Accuracy test procedure –description	1 pc

5.4 MAINTENANCE PROCEDURES

5.4.1 REPLACING THE LAMP ASSEMBLY

**WARNING! The direct ultraviolet radiation from the lamp is dangerous for the eyes and skin.
Do not touch glass surfaces of the lamp.
The lamp house can be hot.**

The lamp, and to a certain extent interference filters, degrades slowly with time.

A halogen lamp is delivered with the code number 981481.

Figure 5-1: The place of the lamp house in Konelab 20 and Konelab 60 is behind the front panel and in Konelab 30 behind the left side panel (seen from the front of the analyser). In case Konelab 30 has the KUSTI option, then the lamp house is behind the front panel.

☞ Change the lamp when the power is turned off.

☞ Open the instrument's left side panel in K30 and front panel in K20, K60 and K30 with KUSTI. Refer to Figure 5-1. Inside the analyzer, behind the black door is the actual lamp assembly: Open the lamp house's door.

☞ To remove the old lamp first spread the metal clips by moving them slightly outward up to the notches. Refer to Figure 5-2. Then pull the lamp assembly out by holding fast of the grey socket.

Remove the old lamp assembly (the lamp equipped with the metal collar) from the grey socket by holding fast of the collar. Discard the old lamp assembly.

☞ Install a new lamp assembly into the socket by holding fast of the metal collar.

Now metal clips should be wide. If not spread the metal clips by moving them slightly outward up to the notches as shown in Figure 5-2.

Then place the assembly into the lamp compartment so that the notch on the metal collar aligns with the positioning pin in the compartment wall. Simultaneously with other hand release the metal clips. Check that they will return to the original locations.

☞ After changing the lamp, perform the function F1 Start-up.

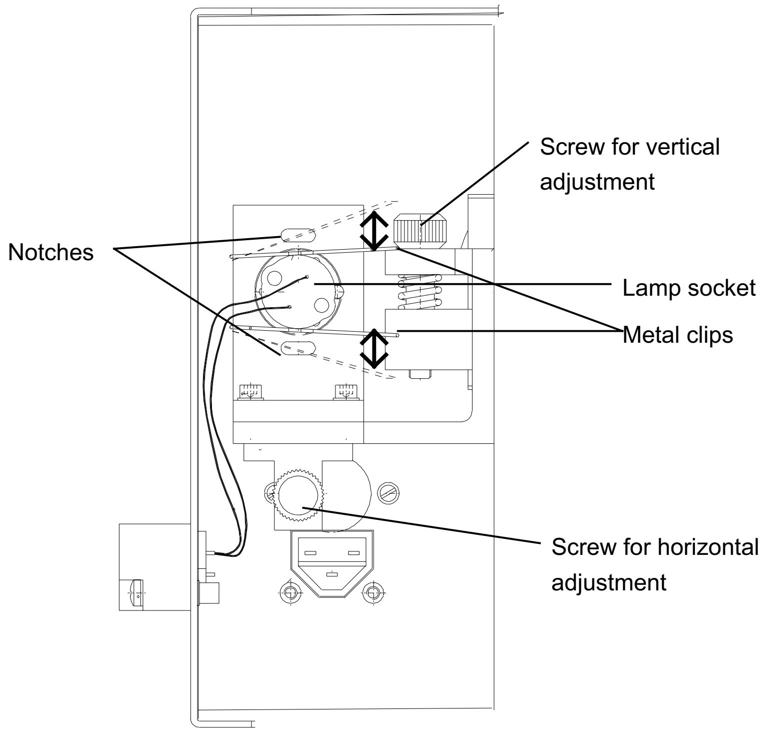


Figure 5-2: The lamp assembly attached with the metal clips: the metal clips are opened when removing the lamp and released when assembling a new lamp.

☞ The lamp is pre-focused and normally does not need to be adjusted.

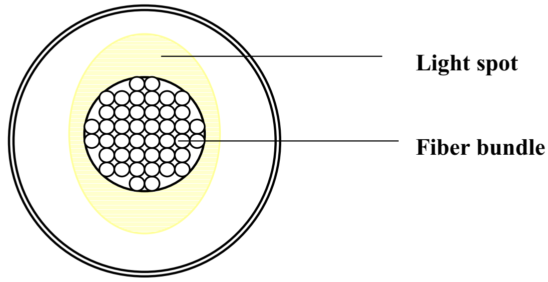
In case the following messages appear, you need to adjust the focus of the lamp:

- Poor water blank
- Not enough light

Before adjusting, make sure that these messages do not come because of bubbles in the fluidic circuit or dirty in cuvettes.

☞ If adjustment is needed, it is done in the Instrument actions window: F8/F5 Adjustment program: 3 Measuring unit: 2 Filter disk/ beam alignment.

When filter disk/ beam alignment is selected the instrument is first driving the filter wheel to its first position. Adjust the beam of the lamp into the middle of the filter position with the adjustment program.
After that the instrument is driving the filter wheel into its empty position. Adjust the light spot so that the fiber bundle is seen in the middle of it (refer to Figure below). Adjustment is done with the horizontal and vertical screws in the lamp assembly.



☞ Close the door of the lamp house and the panel of the instrument.

5.4.2 REPLACING INTERFERENCE FILTERS

CAUTION: Do not put your hand into the analyzer when the light chopper is rotating.

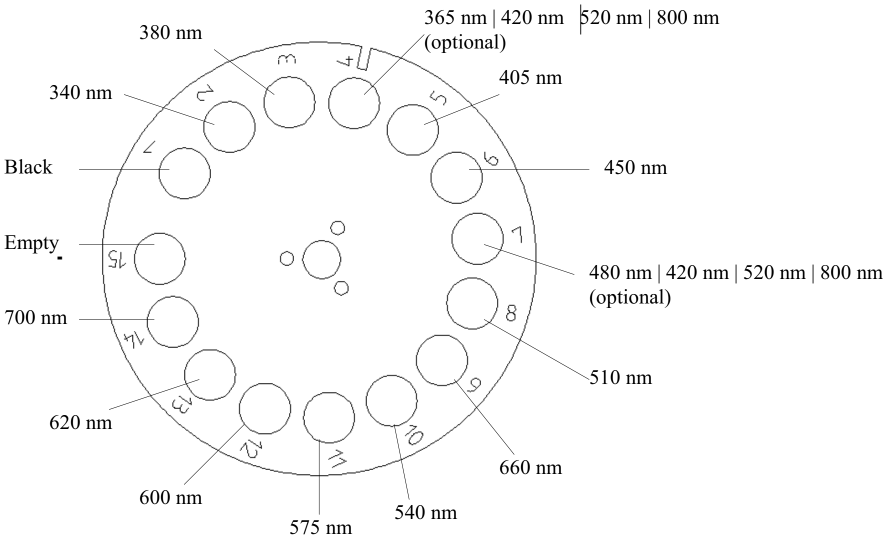


Figure 5-3: Interference filters are attached to the filter wheel. The wheel is in front of the lamp compartment. The wheel positions are numbered from 1 to 15.

The lamp voltage is adjusted automatically during Start up. The values of lamp voltages and signal and reference gains are seen in the window Check water blank. Refer to section 3.13 in Ref. manual.

Possible **gain values** are: 0, 1, 2, 3, 4, 5. When the gain is low the filter is good. With 340 the gain is usually 3 or 4. When 5, the filter or lamp or focus is blocked or getting old and must be changed. With 380 the gain is usually 2 or 3. With all the rest filters 1, 2 or 3. Sometimes even 0.

The lamp voltage is 0 when the filter position is empty.

☞ Change filters when the analyser is switched off.

☞ Open the door of the lamp house. Detach the lamp house shield by opening the crosshead screws on it.

☞ Loosen the filter by unscrewing the holder from the wheel.

☞ One side of the interference filter is coloured the other is silver. Install a new interference filter so that the silver surface is against the light source.

☞ Attach the lamp house shield by screws and close the lamp house door.

5.4.3 REPLACING A SYRINGE

CAUTION: Do not put your hand into the analyzer when the light chopper is rotating.

Checking criteria:

The connections should be tight. Air that gathers into the cylinder or tubes and free, solid material on the piston tips indicate the need of changing the syringe. Syringes should be changed once a year.

5.4.3.1 KONELAB 60 AND 30

☞ Change the syringe when the system is in STAND BY. Make sure that the piston is in the upper position.

☞ Loosen the bottom holding screw (1). Loosen the retaining screw (3), which fixes the block. Pull out the syringe, piston and cylinder. Detach the tubes by unscrewing the fittings on the both sides of the syringe (4); refer to Figure 5-4.

☞ Take a new syringe.

CAUTION! Tightening the screws (1), (3) in the wrong order and when the piston is in the down position may break the cylinder.

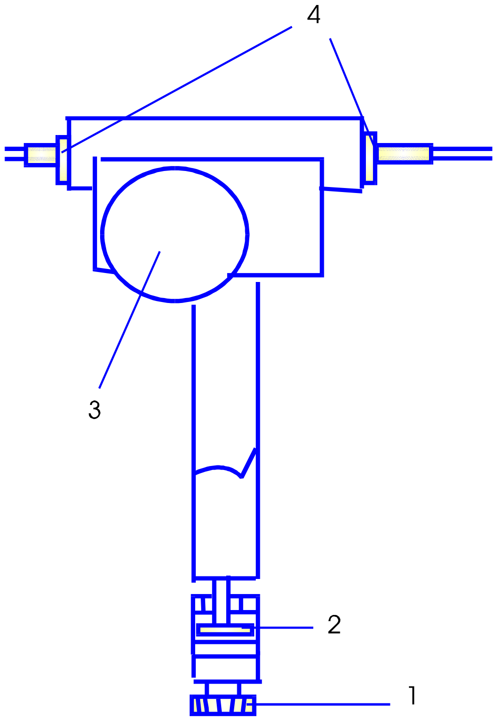


FIGURE 5-4a: The syringe unit of Kl60 and 30

1. *Screw*
2. *Clamp*
3. *Screw*
4. *Fittings*

☞ Screw the fittings with the tubes on the both sides of the syringe. Ensure that the connections are watertight.

☞ Place the syringe into the clamp. Ensure that the syringe is straight.

☞ Tighten the retaining screw (3) and then the holding screw (1) <u>in this order</u>.

5.4.3.2 KONELAB 20

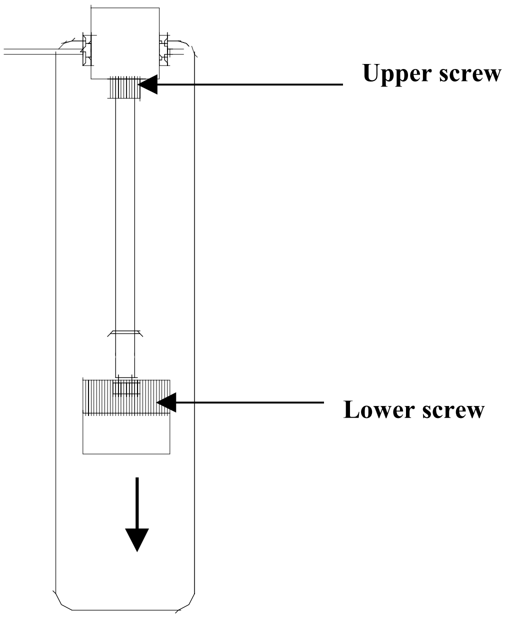


Figure 5-4b: The syringe unit of Konelab 20

☞ Change the syringe when the system is in STAND BY.

☞ Loosen the lower screw. Draw it down so that the piston is not following.

☞ Loosen the upper screw and take the old syringe out. Replace it with a new one. Tighten the upper screw.

☞ Push the lower screw up, tighten it and make sure that it draws the piston properly.

5.4.4 REPLACING NEEDLE UNITS

Dispensing needle(s) for sample/ reagent dispenser arm(s) are delivered with the code number 984010.

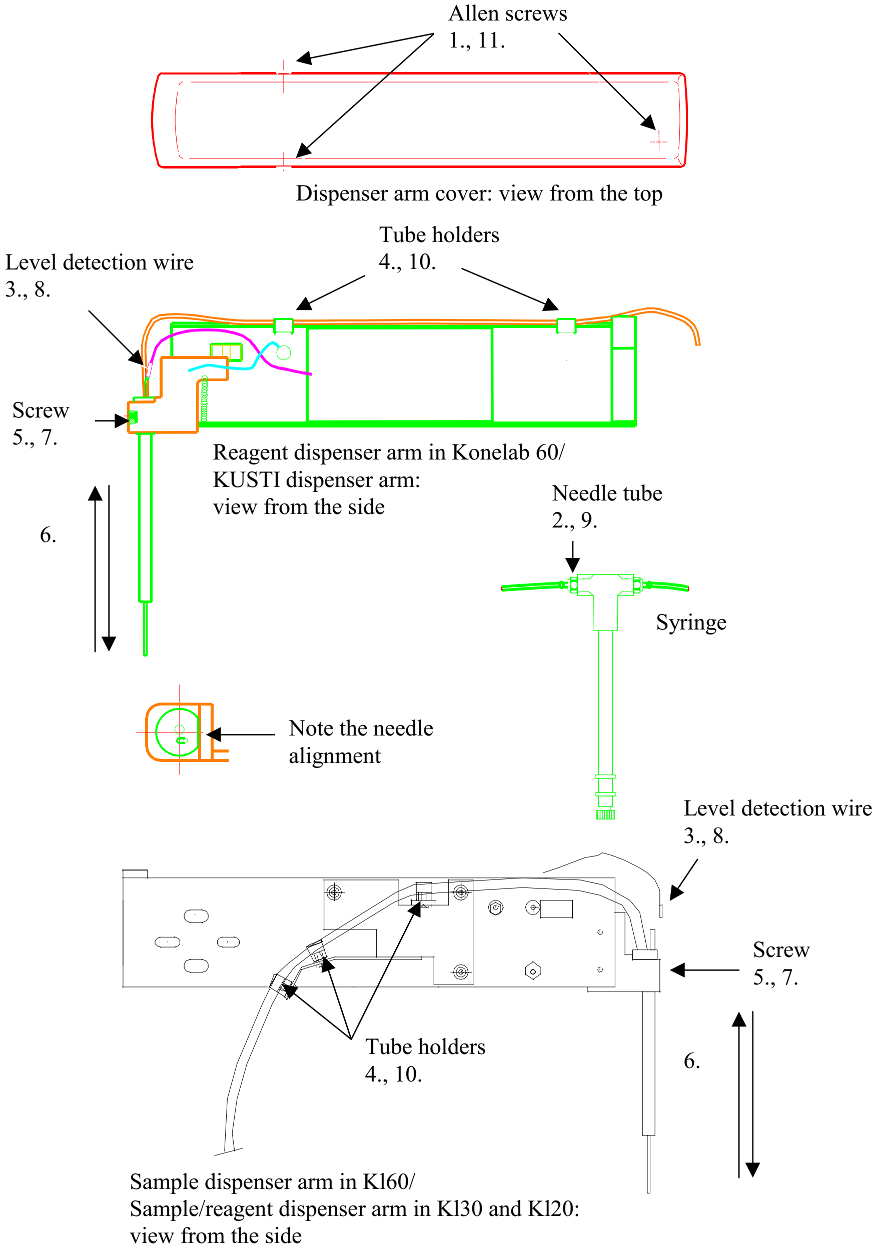
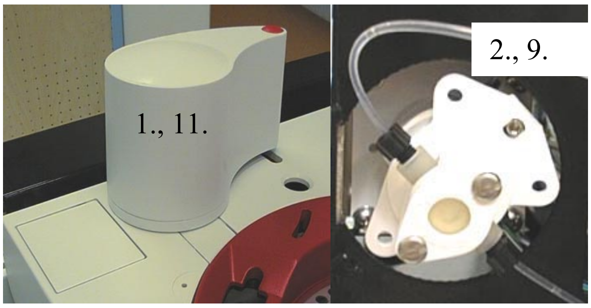


Figure 5-5: A sample/ reagent needle assembly

1. Remove the dispenser arm cover by detaching the three Allen screws on both sides and top of the cover.
2. Detach the needle tube from the syringe.
3. Detach the level detection wire from the connector in the needle.
4. Detach the tube from holders at the arm.
5. Open the screw at the needle holder.
6. Remove the needle and replace it with a new needle assembly. Note the alignment: the even side of the needle assembly must be alongside with the dispenser arm so that the needle goes down properly.
7. Close the screw at the needle holder.
8. Connect the level detection wire to the connector in the needle assembly.
9. Connect the tube to the syringe.
10. Attach the tube to holders at the arm.
11. Check that the needle assembly is properly in place. Attach the cover to the dispenser arm. The right position of the needle can be checked with F5 in Instrument actions window.
12. Perform water wash, F6 in Instrument actions window to wash the needle.

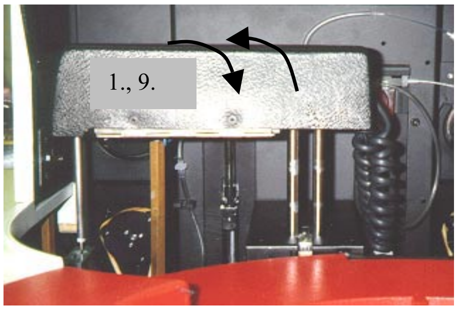
KUSTI dispensing needle



Dispensing needle for the KUSTI module is delivered with the code number 984073.

1. Lift the KUSTI cover up.
2. Detach the needle tube from the FMI pump found behind the door in front of the instrument.
3. Detach the level detection wire from the connector in the needle.
4. Detach the tube from holders at the arm.
5. Open the screw at the needle holder.
6. Remove the needle and replace it with a new needle assembly. Note the alignment: the even side of the needle assembly must be alongside with the dispenser arm so that the needle goes down properly.
7. Close the screw at the needle holder.
8. Connect the level detection wire to the connector in the needle assembly.
9. Connect new tube to the FMI pump.
10. Attach the tube to holders at the arm.
11. Check that the needle assembly is properly in place. Attach the cover to the dispenser arm. The right position of the needle can be checked with F5 in Instrument actions window.
12. Perform water wash, F6 in Instrument actions window to wash the needle.

Dispensing needle for ISE dispenser arm is delivered with the code number 984011.



Cover of ISE Dispenser arm

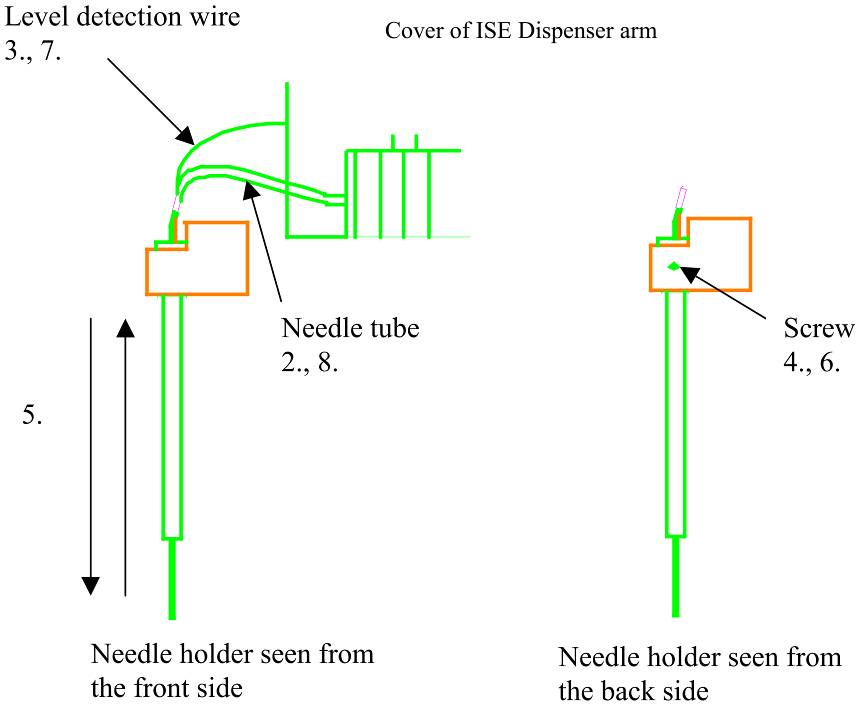
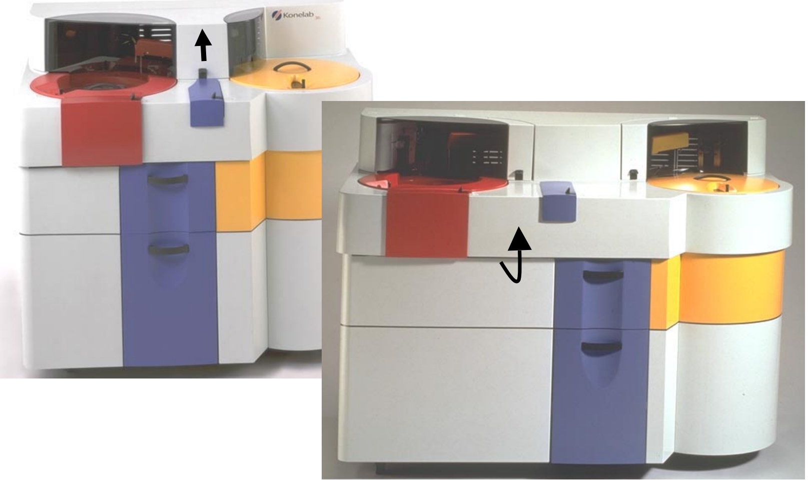


Figure 5-6: An ISE needle assembly

1. Open the cover of the ISE dispenser arm. The cover is hinged, so it is easy to turn open.
2. Detach the needle tube from the end slice of the ISE block.
3. Detach the level detection wire from the connector in the needle.
4. Open the screw at the back of the needle holder.
5. Remove the needle and replace it with a new needle assembly. Note the alignment: the even side of the needle assembly must be alongside with the dispenser arm so that the needle goes down properly.
6. Close the screw at the needle holder.
7. Connect the level detection wire to the connector in the needle assembly.
8. Connect the tube to the end slice.
9. Check that the needle assembly is properly in place. Close the cover of the ISE dispenser arm. The right position of the needle can be checked with F5 in Instrument actions window.

10. Perform water wash, F6 in Instrument actions window to wash the needle.

5.4.5 REPLACING MIXING PADDLES



Mixing paddle(s) for mixer arm(s) are delivered with the code number 984012.

Figure 5-7: When replacing mixing paddles in Konelab 60, open the whole dispensing cover. There is a bearing rod to keep the cover open. In Konelab 30 is only need to open the upper cover.

☞ The mixing paddle is fastened with a screw. Open the screw. There is no need to open the mixing arm's cover.

☞ Assemble a new mixing paddle. Fasten the screw.

5.4.6 REPLACING TUBES

Liquids in the tubes should move smoothly and the tube connections should be airtight. Permanent flatness especially in the pump tubes are not allowed. If the tubing shows signs of deterioration e.g. colour changes it must be changed.

Recommended changing interval for pump tubes and diluent and wash tubes is twice a year. Drain and waste tubes are recommended to change once a year.

You can change tubes only when the analyser is switched off.
Do not touch the tubing while analysis is in progress.

Some guidelines when changing the tubing:

☞ Remove the distilled water container.

☞ Perform twice Water wash, F6 in Instrument actions to remove the liquids from the tubing before changing.

☞ After changing, replace the distilled water container.

☞ Perform twice Water wash, F6 in Instrument actions prior to start analysis. This will fill the tubes with distilled water and at the same time you can check the tightness of the tube connections and that there are no air bubbles in the tubes after replacing them.

5.4.6.1 REPLACING PUMP TUBES

Konelab 20

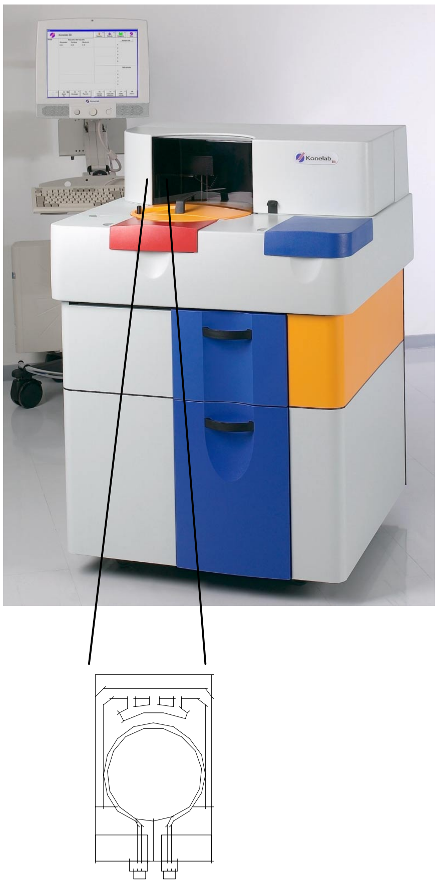


Figure 5-8: The place of the ISE washing pump in Konelab 20i

Konelab 20i includes two FMI pumps and one conventional pump, ISE Washing pump, for outside washing of the ISE dispensing arm needle.

Inside of the ISE Washing pump cover is a short yellow ismaprene tube. Refer to section 5.4.6.4 Replacing ISE tubes to replace it.

Konelab 60 and Konelab 30

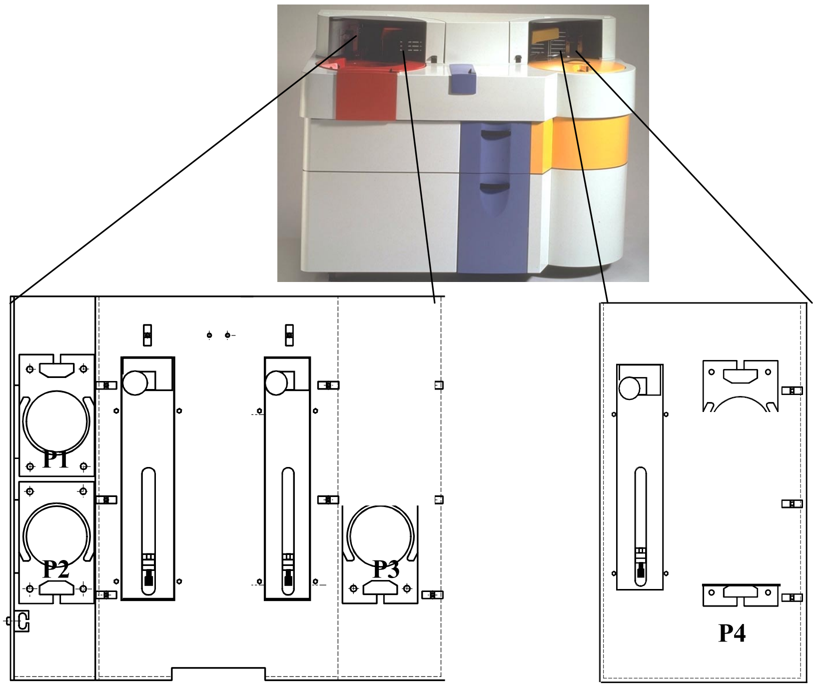


Figure 5-9a: The places of pump tubes in Konelab 60i

Pump tubes are included in:
- 984023 diluent and wash tubes for K30 and 30i,
- 984021 diluent and wash tubes for K60 and 60i,
- 984020 ISE Complete tubing kit for K30i and 60i

P1; ISE dispensing pump is used to transfer a sample and ISE Calibrator solution 1 to the ISE block and after measurement to the waste.

P2; Washing pump is used for outside washing of the ISE dispensing arm needle.

P3; Washing pump is used to wash the sample mixer.

P4; Washing pump is used to wash the reagent mixer.

Washing pump tubes (P2, P3 and P4) are yellow ismaprene tubes and they have lilac bridges, ISE dispensing pump tube (P1) is a transparent PVC tube and it has grey bridges.

Pump tubes are delivered separately with the code numbers:
- 980306 (transparent PVC tube with grey bridges for ISE dispensing pump) and
- 981342 (yellow ismaprene tube with lilac bridges for washing pumps)

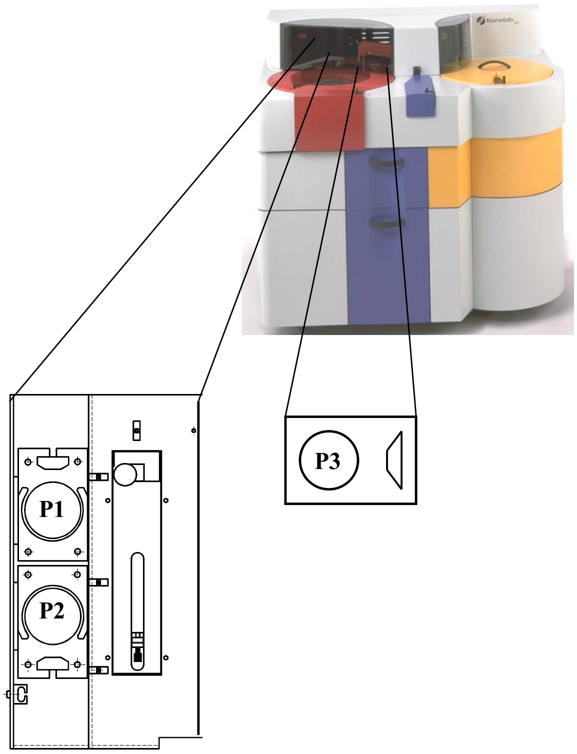


Figure 5-9b: The places of pump tubes in Konelab 30i

P1; ISE dispensing pump is used to transfer a sample and ISE Calibrator solution 1 to the ISE block and after measurement to the waste.

P2; Washing pump is used for outside washing of the ISE dispensing arm needle.

P3; Washing pump is used to wash the mixer.

Washing pump tubes (P2 and P3) are yellow ismaprene tubes and they have lilac bridges, ISE dispensing pump tube (P1) is a transparent PVC tube and it has grey bridges.

To remove the old tube in Konelab 60 and 30

☞ Pull up the tube and lift the collar from the notch. Refer to Figure 6-10.

☞ Manually rotate the pump clockwise. Simultaneously pull the tube out.

☞ Detach the tube from the fittings.

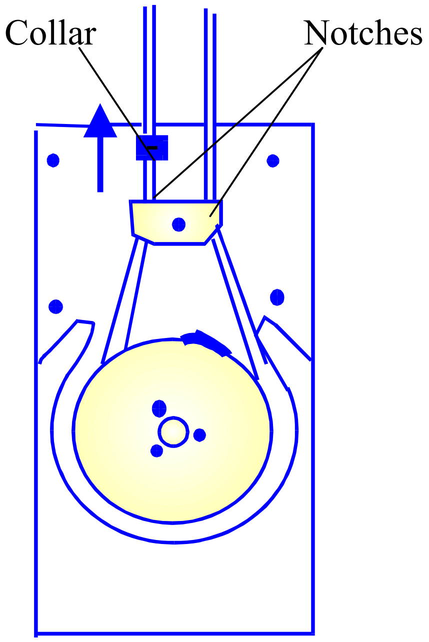


Figure 5-10: Detachment of the pump tube

Install the tubes in a reverse manner to removal

Make sure that the pump tube doesn't get twisted.

☞ Attach the tube to the fittings.

☞ Set the tube to the steering roller and rotate the pump clockwise. Let the rotation of the pump feed the tube. Do not stretch it.

☞ Lift the collar into the notches.

☞ Check that the tube is on every steering roller.

☞ Rotate the pump to check the water feed.

Diluent and wash tubes are delivered for Konelab 60 with the code number 984021.

5.4.6.2 REPLACING DILUENT AND WASH TUBES

Refer to Figures 5-11, 5-13 and 5-15 to see the places of tubes and to Figures 5-12, 5-14 and 5-16 to see the configuration of tubes.

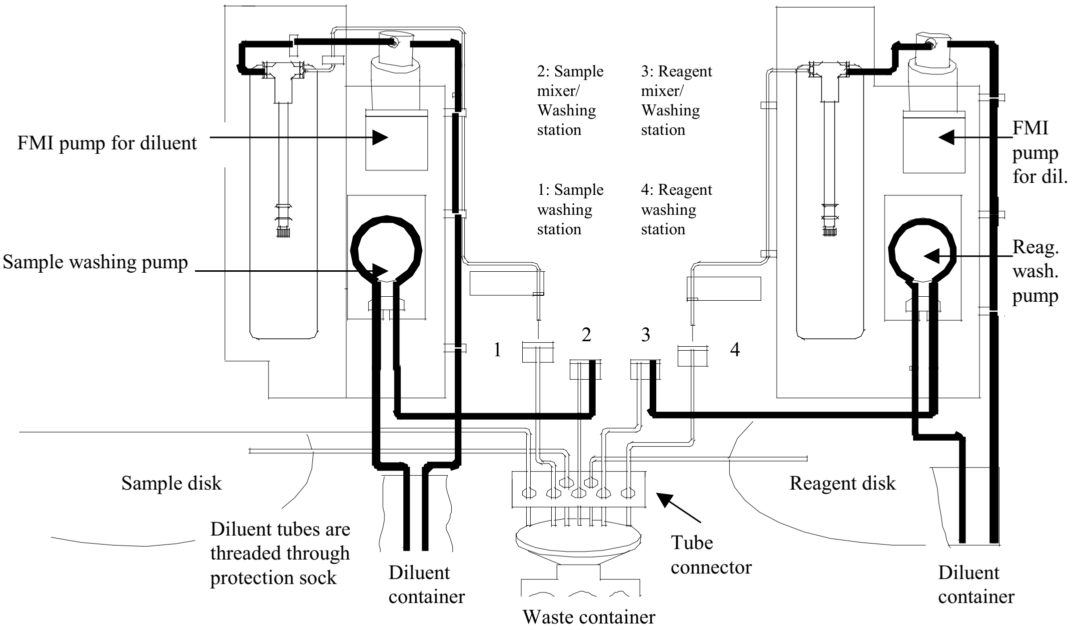


Figure 5-11: The places of diluent and wash tubes in Konelab 60

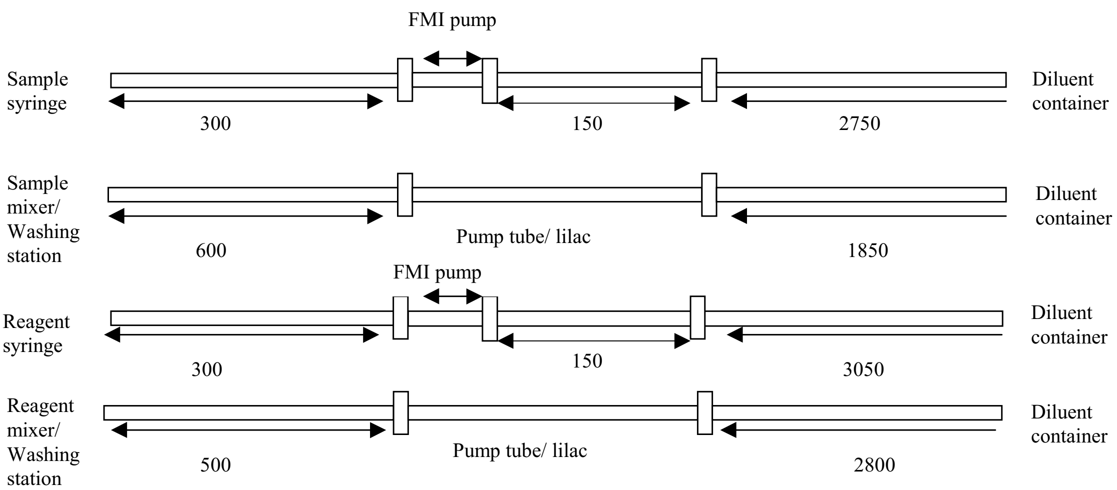
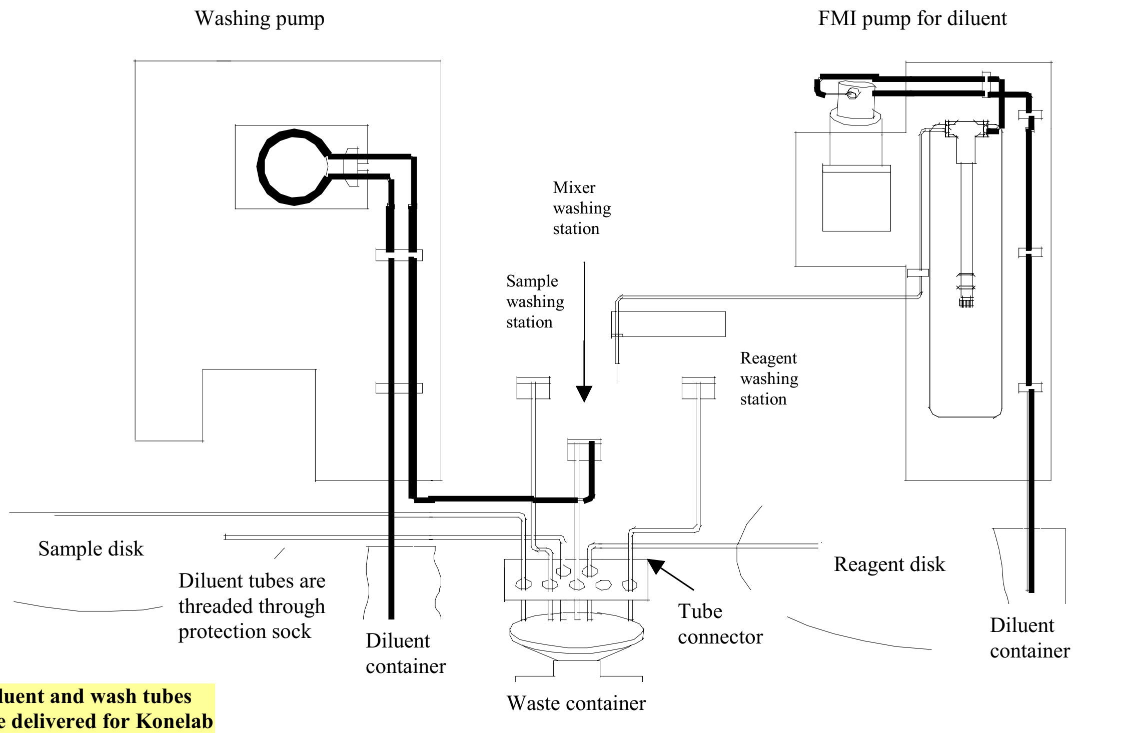


Figure 5-12: Diluent and wash tubes (984021) in Konelab 60



Diluent and wash tubes are delivered for Konelab 30 with the code number 984023.

Figure 5-13: The places of diluent and wash tubes in Konelab 30

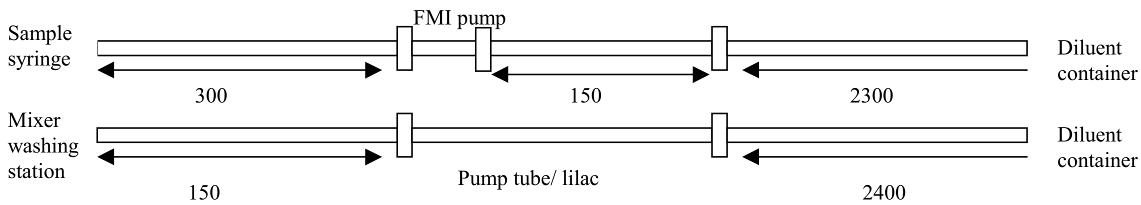


Figure 5-14: Diluent and wash tubes (984023) in Konelab 30

Diluent and wash tubes are delivered for Konelab 20 with the code number 984072.

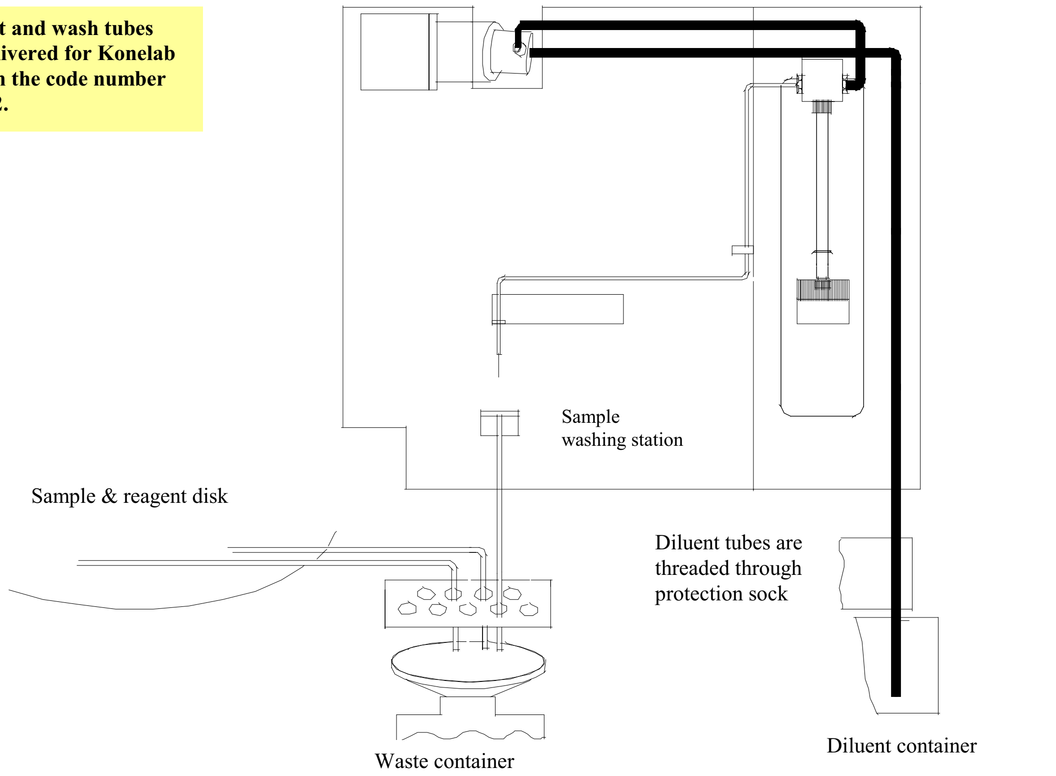


Figure 5-15: The places of diluent and wash tubes in Konelab 20

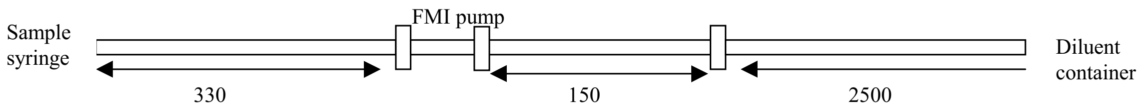


Figure 5-16: Diluent and wash tubes (984072) in Konelab 20

Those tubes which other end is in the diluent water container can be put in their places using the help of the old ones: Connect the new tube to the old one using a fitting and draw the old tube so that the new tube follows. Detach the old tube from the new one and discard the old tube.

☞ Detach the old tubes from the connectors. Tweezers may help detaching. In Konelab 60 is needed to open the middle part of the back panel. It is fastened with screws.

☞ Install new tubes to the connectors.

5.4.6.3 REPLACING DRAIN AND WASTE TUBES

Drain and waste tubes for K60 and K30 are delivered with the code number 984022.

Refer to Figures 5-17, 5-19 and 5-21 to see the places of tubes and to Figures 5-18, 5-20 and 5-22 to see the configuration of tubes. In Konelab 60 and 30 one tube is coming from the sample disk and another tube is coming from the reagent disk to the wastewater container. They are for condensing water, and they are not necessary to change. In Konelab 20 there are two similar tubes coming from the combined sample & reagent disk.

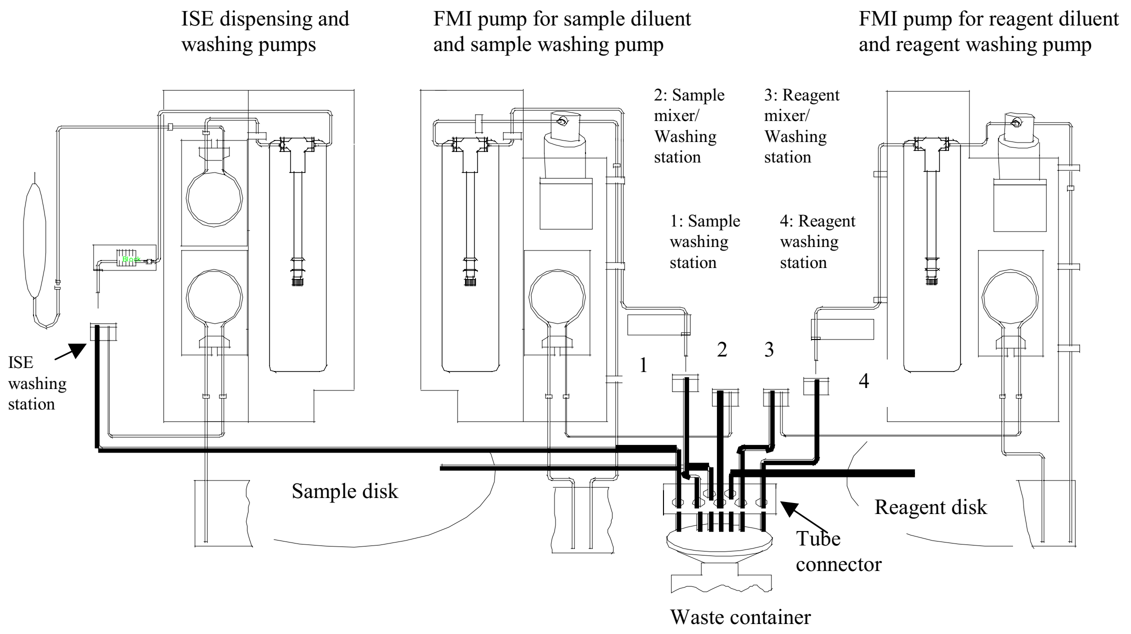


Figure 5-17: The places of drain and waste tubes in Konelab 60i

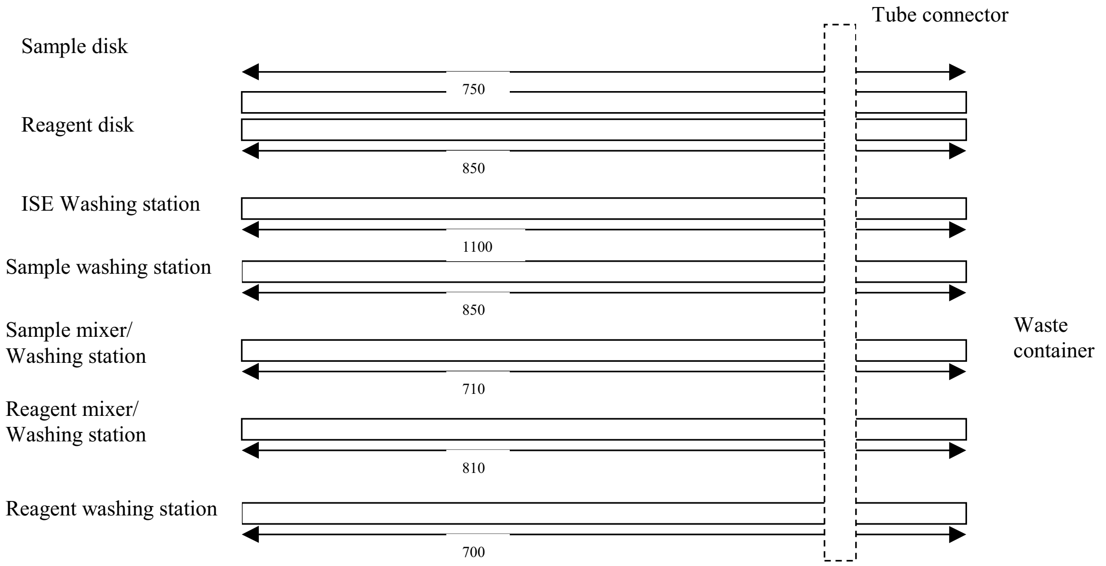


Figure 5-18: Drain and waste tubes (984022) in Konelab 60i

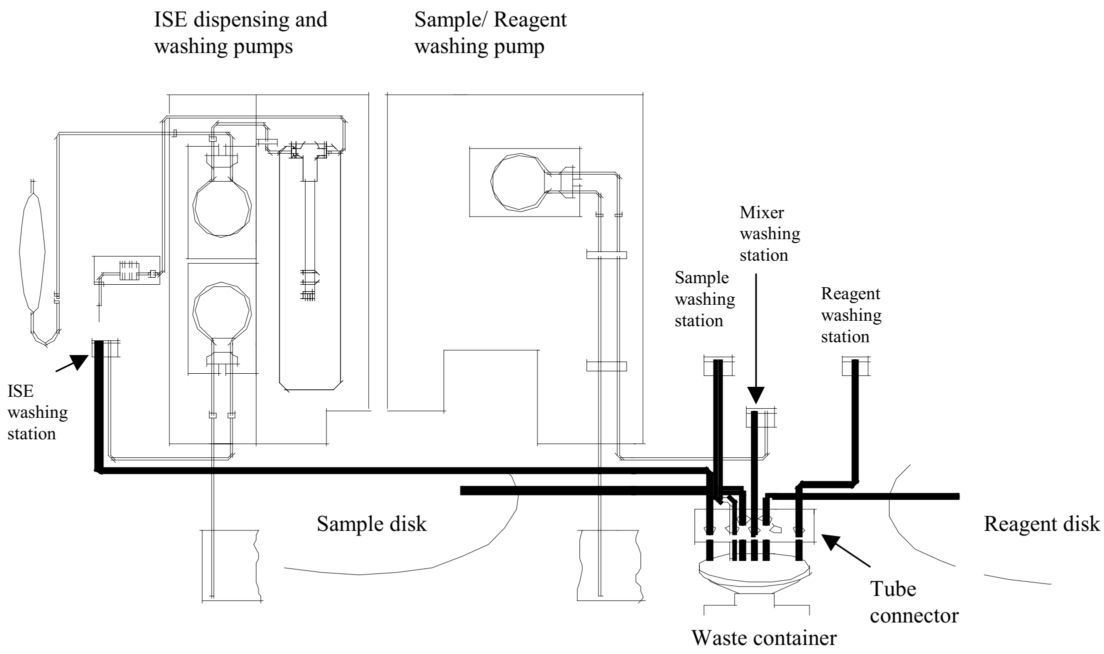


Figure 5-19: The places of drain and waste tubes in Konelab 30i

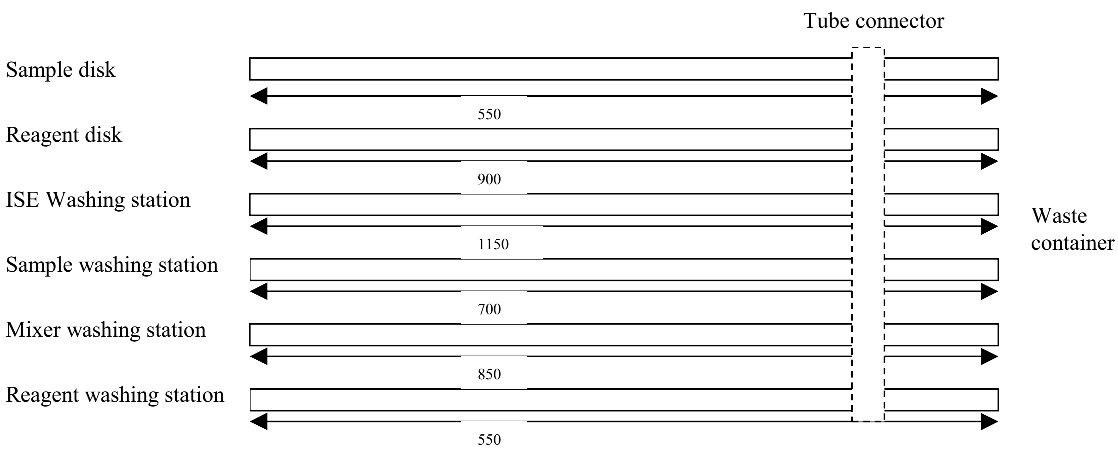


Figure 5-20: Drain and waste tubes (984022) in Konelab 30i

The right side panel (under the reagent disk) is needed to open in Konelab 60 and 30. It is fastened with screws. In Konelab 30 also the back panel is needed to open to put the mixer waste tube in its place.

Drain and waste tubes for K20 are delivered with the code number 984071.

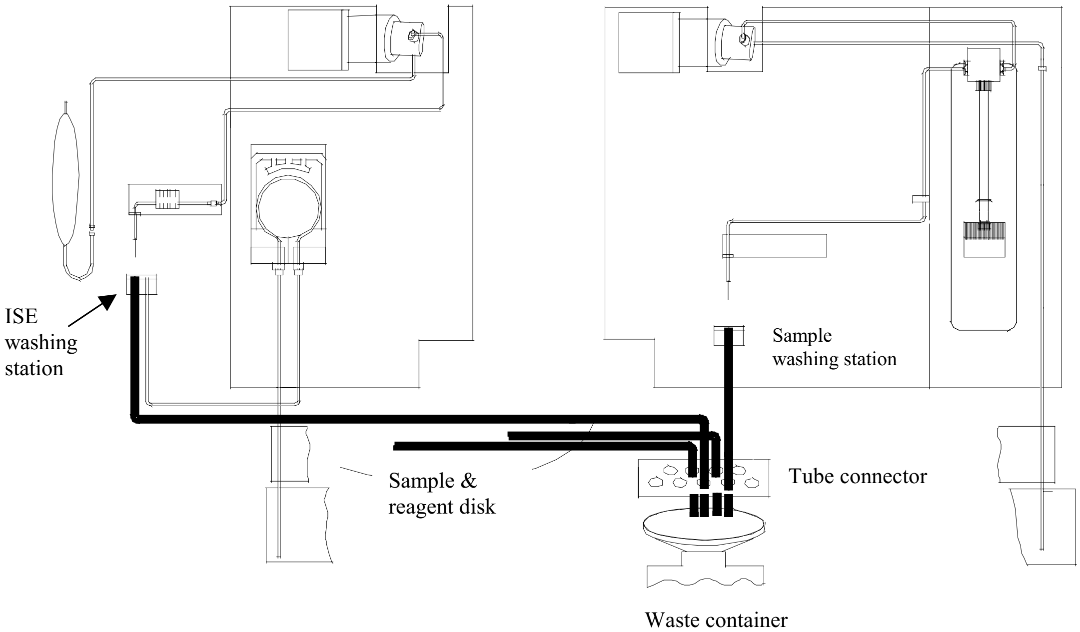


Figure 5-21: The places of drain and waste tubes in Konelab 20I

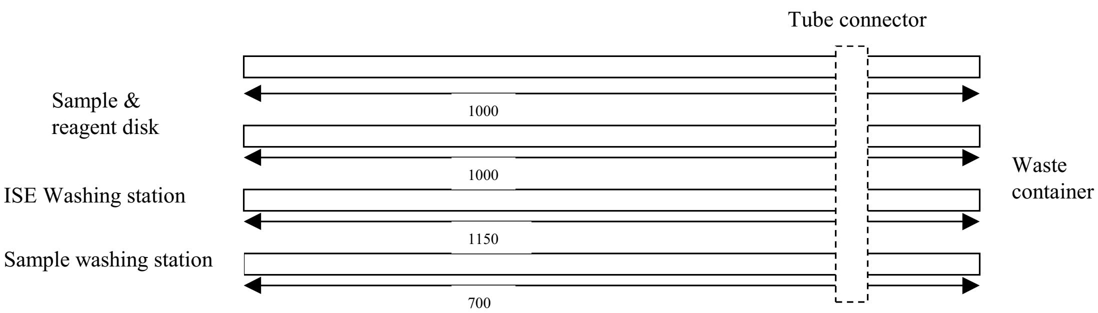


Figure 5-22: Drain and waste tubes (984071) in Konelab 20i

☞ Install new tubes using the help of the old ones: Connect the new tube to the old one using a fitting (the end in the wastewater container) and draw the old tube so that the new tube follows. Detach the old tube from the new one and discard the old tube.

☞ Set the new tube into the fitting and put the tube connector in its place.

5.4.6.4 REPLACING ISE TUBES

ISE tubes for K60 and 30 are delivered with the code number 984020.

Pump tubes for K60 and 30 are delivered separately with the code numbers 980306 (transparent PVC tube with grey bridges for diluent pump) and 981342 (yellow ismaprene tube with lilac bridges for washing pump).

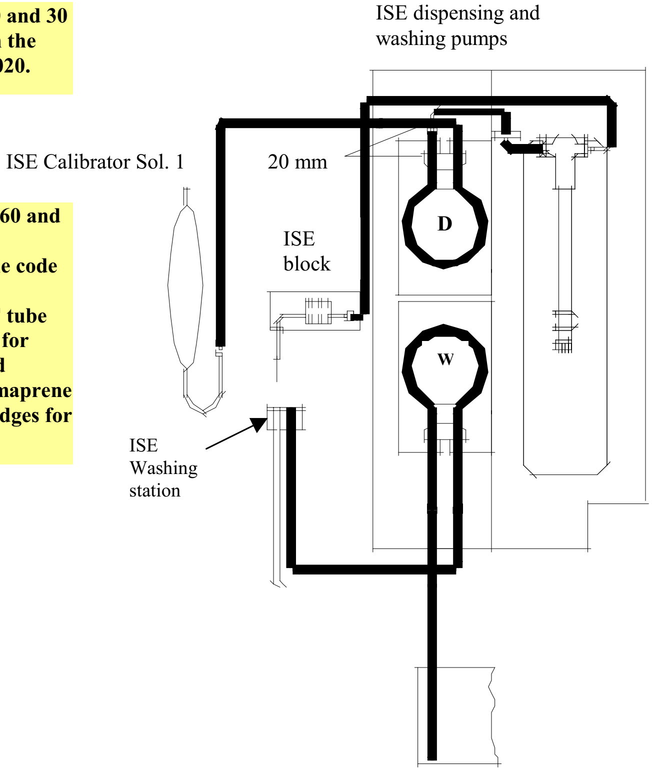


Figure 5-23: The places of ISE Complete tubing in Konelab 60i and 30i

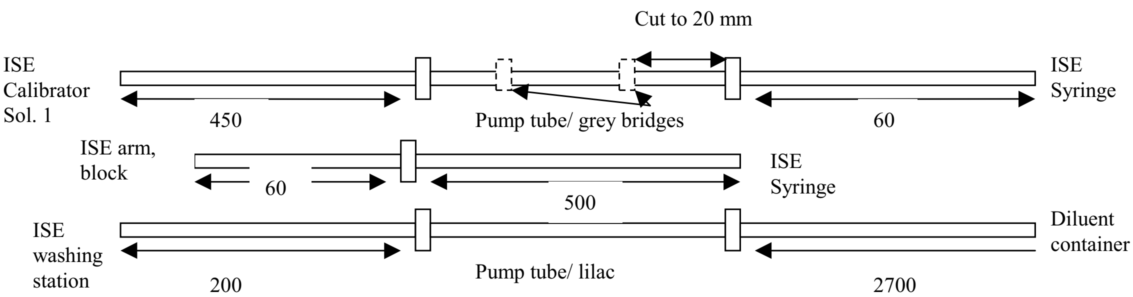


Figure 5-24: ISE Complete tubing (984020)in Konelab 60i and 30i

☞ Detach the old tubes from the connectors. Tweezers may help detaching. The tube between the wash pump and the diluent water container can be put in its place using the help of the old one: Connect the new tube to the old one using a fitting and draw the old tube so that the new tube follows. Detach the old tube from the new one and discard the old tube. In Konelab 30 is needed to open the middle part of the back panel. It is fastened with screws. Install new tubes to the connectors.

ISE tubes for K20 are delivered with the code number 984070.

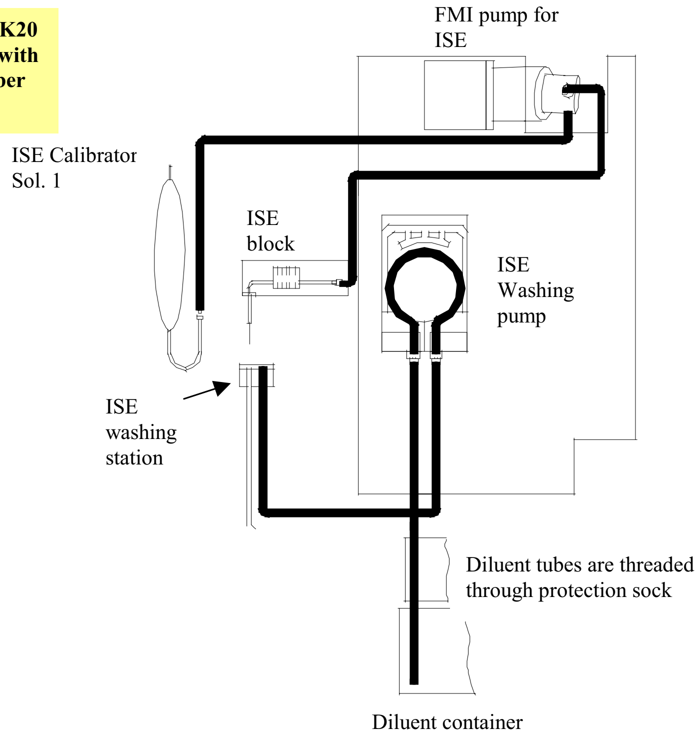


Figure 5-25: The places of ISE complete tubing in Konelab 20i

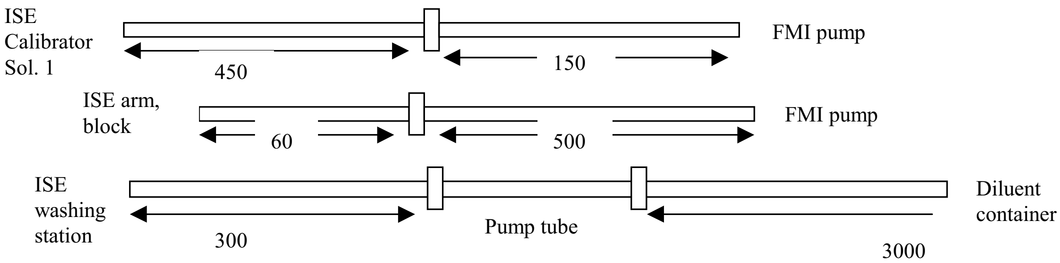
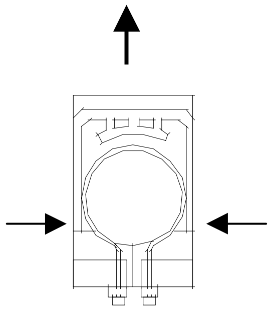


Figure 5-26: ISE Complete tubing (984070) in Konelab 20i

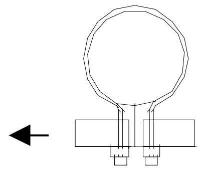
☞ Detach the old tubes from the connectors. Tweezers may help detaching. The tube between the wash pump and the diluent water container can be put in its place using the help of the old one: Connect the new tube to the old one using a fitting and draw the old tube so that the new tube follows. Detach the old tube from the new one and discard the old tube. Install new tubes to the connectors.

To replace the ISE washing pump tube

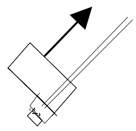
1.)



2.)



3.)



☞ Inside ISE washing pump cover is a short yellow tube. To replace it:

1) First press the cover from both sides and lift it up.

2) Then draw the gray, plastic holder outwards.

3) Push the gray, plastic holder up so that you can see the end of the tube.

4) Replace the tube and connect the holder and cover in their places.

KUSTI tubes are delivered with the code number 984069.

5.4.6.5 REPLACING KUSTI TUBES

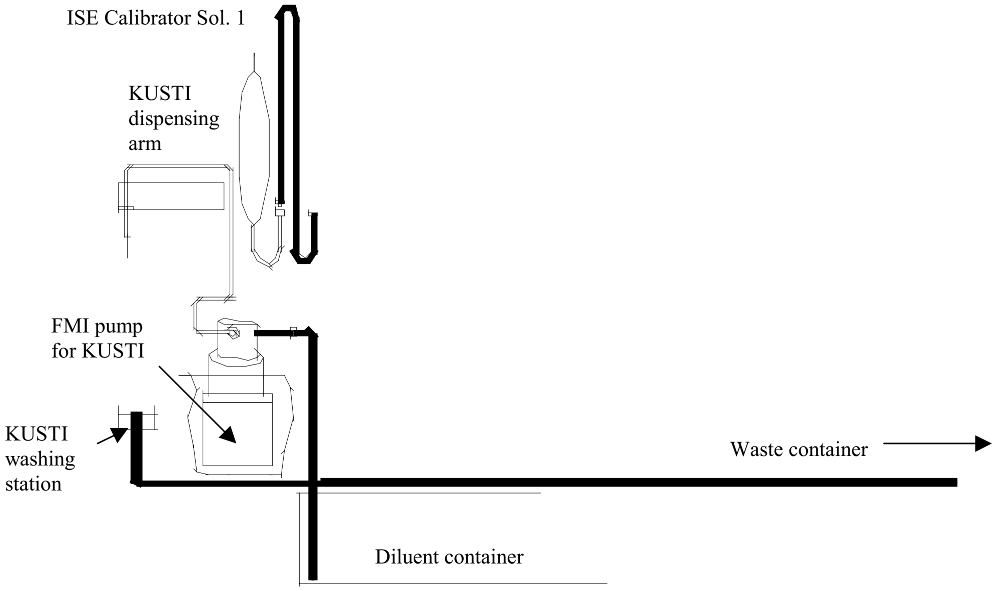


Figure 5-27: The places of KUSTI tubes

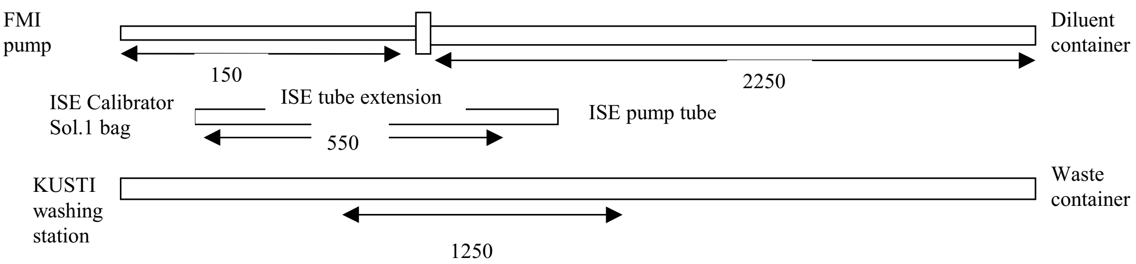


Figure 5-28: KUSTI Complete tubing (984069)

☞ Detach the old tubes from the connectors. Tweezers may help detaching. The wash tube between the FMI pump and the diluent water container, and the waste tube between KUSTI washing station and waste container can be put in its place using the help of the old one. Connect the new tube to the old one using a fitting and draw the old tube so that the new tube follows. Detach the old tube from the new one and discard the old tube.

☞ Install new tubes to the connectors.

5.4.7 REPLACING ELECTRODES

Deionized water or other solvents must never be in contact with the membranes. Store the electrode block so that the measurement channel is empty.

The expected lifetime of electrodes is shown in the following table. The main criterion for replacing is unsatisfied quality control values. The allowed values for the ISE tests' calibrations are seen in section 5.2.3.

Electrode	Months or	Samples
Cl	6 - 8 or	10 000
Ca	4 - 6 or	8000
Li	4 - 6 or	8000
K	8 or	10 000
Na	12 - 18 or	20 000
PH	12 - 18 or	20 000
Ref	8 - 12 or	20 000

Replacing an electrode:

An electrode should be removed and replaced by a new electrode when performance becomes unsatisfactory.

When assembling electrodes or replacing an electrode, either use new o-rings or place the old rings in the same positions they were earlier. There must always be an o-ring between two electrodes.

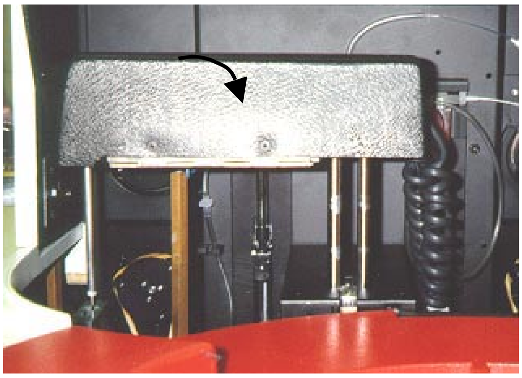


Figure 5-29: The ISE dispensing arm

☞ Turn the cover of the ISE dispensing arm so that you can see the position of the block. The cover is hinged, so it is easy to open.

☞ Disconnect the signal wires and caps from the connecting pins of the measuring electrodes (colour coded). It is not necessary to disconnect the sample detection and grounding wires from the connectors in the end slices.

☞ Release the electrode block turning the lever and detach the block from the end slices.

☞ Press the end slices together to keep the liquid line closed.

☞ Detach only the electrode that needs replacement. Follow the instructions in sections 9.7.1. - 9.7.2. for the material, installation and assembling.

☞ Fill the Installation and Warranty Sheets of the electrode. These sheets are enclosed to each Electrode Kit.

After positioning the electrode block do the following:

☞ Carry out START UP. Give some ISE requests and enter sera as sample.

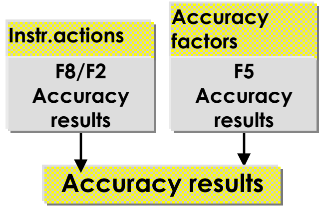
After replacing an electrode a pre run of sera must be analysed with subsequent new calibration.

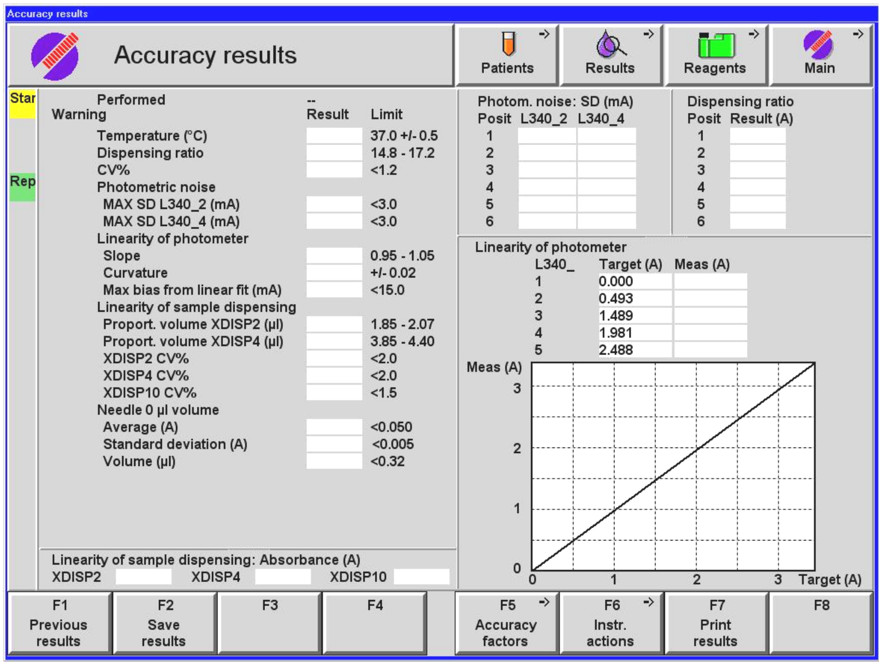
☞ Check the detailed calibration data in the Calibration results window for all those electrodes that has been changed.

☞ If problems occur, check the connections of the electrodes and ISE calibrator 1. Recalibrate in the Calibration / QC selection window.

When calibration is successful, a pre run of 10 sera should be analysed with subsequent new calibration before analysing patient samples.

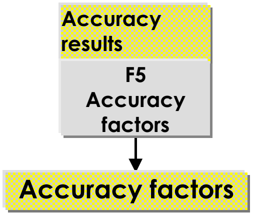
5.5 ACCURACY RESULTS

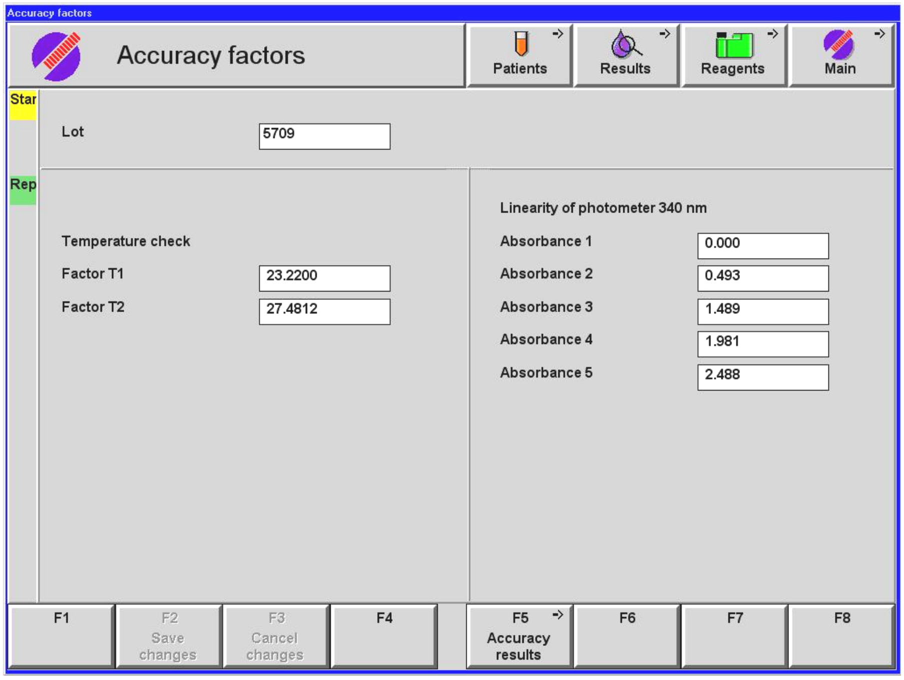




After the preventive maintenance done once per year it is recommended to perform accuracy measurements to check the condition of instrument. Results of these measurements are seen in this window. Results are coming automatically from the database of the measurement.

5.5.1 ACCURACY FACTORS





Accuracy measurements are done with the accuracy solution kit. Authority measures values of these solutions. Lot dependant factors, affecting accuracy result calculations, are given in this window.

Section 6 Error Messages & Troubleshooting

6.1 GENERAL

The analyser's internal PC and workstation's PC communicate with each other through the Ethernet cable using the protocol TCP/IP. The first one receiving a message at the workstation is TRAREC (transmit/ receive). TRAREC sends messages to the internal PC.

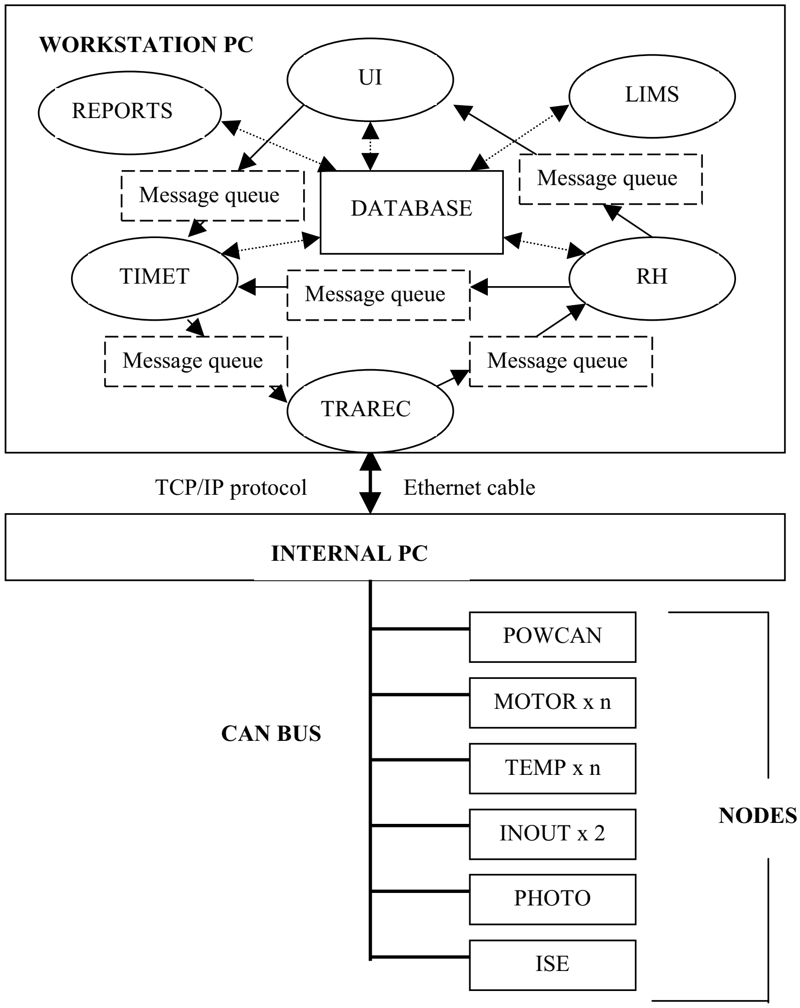


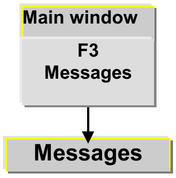
Figure 6-1: The pattern of communication inside the workstation PC and between the analyser's internal PC and workstation PC.

TRAREC re-sends messages in a queue to the response handler (RH). In addition of response handler, other parts, which handle messages at the workstation side, are

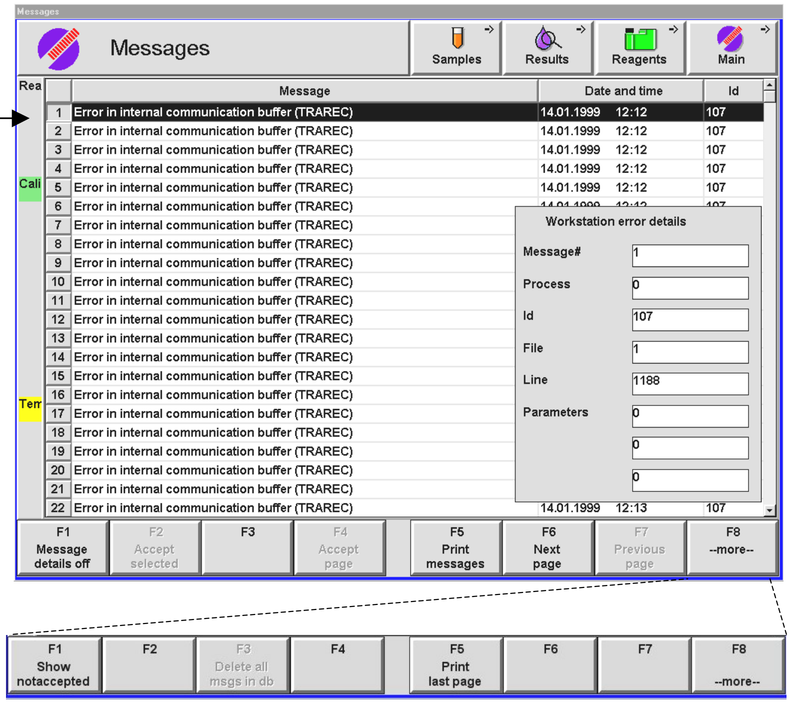
user interface (UI), timetable (TIMET), laboratory information management system (LIMS) and reports. All these parts are operating with the workstation database and to handle messages in a correct order the database must be locked after each message. Refer to Figure 8-1 on the previous page.

The transmitted message is framed with the software codes and this framed message is called a packet. See e.g. the message 102.

6.2 CHECKING MESSAGES



When you contact a Service engineer, please take the details of error messages!



Messages informed in the Main window and all messages in the database are seen in the Messages window.

Information seen in the MESSAGES window:

	The first is the message list number.
- *Message*	The explanation of the message.
- *Date and time*	The date and time when the message was sent.
- *Error nbr*	First is the process number (e.g. 0), which sent the message; immediately followed by the numbers, which identifies the error (e.g. 107).

You can select with F8/F1 whether all messages or those messages, which are not yet accepted, are seen.

☞ Activate F1 to see the details of the message. Pressing the button again removes the details from the window.

Detailed information from the message:

- *Message #*	The number in the message list.
- *Process*	The process identification, which sent the message.
- *Error nbr*	The number, which identifies the error.
- *Error id*	The data of the event place: the identification of the unit, the position and serial number of the board, the number of the file and the line in the file.
- *Parameters*	Parameter number.
- *Status*	Status number.

To print messages

☞ Activate F5 to print messages. With F8/F5 you can print the last page of messages.

To remove the message

☞ Activate F2 to accept and remove the selected message from this window and from the Main window.

☞ Activate F4 to accept and remove all messages seen in the window.

Activate F8/F3 to delete all messages from the database.

6.3 ERROR MESSAGES

6.3.1 ERROR MESSAGES COMING FROM THE WORKSTATION

6.3.1.1 MESSAGES FROM THE ANALYSER, MESSAGES TO THE ANALYSER (0 - TRAREC)

2 FULL MESSAGE QUEUE DETECTED (TRAREC)
3 MESSAGE QUEUE STAYS FULL (TRAREC)
CANNOT OPEN MESSAGE QUEUE (TRAREC)
5 NO FREE MESSAGE BUFFER AVAILABLE (TRAREC)
6 INTERNAL MESSAGE BUFFER ERROR (TRAREC)

☞ Software's internal communication error. Restart the workstation. Refer to section 6.4.1.

In case the instrument is switched off and the message 105 appears, no action is necessary.

101 INSTRUMENT HAS BEEN CLOSED
102 CANNOT SEND PACKET TO INSTRUMENT
103 WRONG PACKET SIZE FROM INSTRUMENT
104 INSTRUMENT COMMUNICATION ERROR: WRONG END
105 CANNOT RECEIVE PACKET FROM INSTRUMENT

Communication fault between the workstation and the analyser.

☞ Possible causes

E.g. switching off the instrument (normal case), software problem, error in updating, faulty cable or broken board.
- Reboot the instrument. If the problem persist, check the Ethernet cable connection. If it is OK call service.

106 ERROR IN READING FROM MESSAGE QUEUE (TRAREC)
107 ERROR IN INTERNAL COMMUNICATION BUFFER (TRAREC)

☞ Software's internal communication error. Restart the workstation. Refer to section 6.4.1.

999 TRAREC ERROR MESSAGE %u
- %u MEANS THE ERROR NUMBER

- Software problem. Analysis continues.

6.3.1.2 TIME TABLE (1 - TIMET)

1002 FULL MESSAGE QUEUE DETECTED (TIMET)
1003 MESSAGE QUEUE STAYS FULL (TIMET)
1004 CANNOT OPEN MESSAGE QUEUE (TIMET)

☞ Software's internal communication error. Restart the workstation. Refer to section 6.4.1.

1021 DATABASE LOCK ERROR (TIMET)

☞ Internal software problem with the database. Analysis will stop after requests under analysis are completed. Press START to continue analysis. If the problem persists, restart the workstation. Refer to section 6.4.1.

1022 ERROR WHEN DOING DATABASE OPERATION (TIMET)
1031 WRONG DATA FROM DATABASE (TIMET)
1032 WRONG DATA FROM AN OTHER PROCESS (TIMET)
1033 INTERNAL DATA ERROR (TIMET)

☞ Warning about internal software problem in the database. Analysis will stop after requests under analysis are completed. Press START to continue analysis. If the problem persists, restart the workstation. Refer to section 6.4.1.

*) →

1041 CANNOT OPEN OR READ %S.INI (TIMET)
1042 CORRUPTED KONELAB.INI (TIMET)

☞ Warning about problem in the configuration, filter or temperature data. Check the data in the Configuration window. Refer to section 3.8 (Ref. manual.) If the problem persists, contact service.

1201 ANALYSING NOT ALLOWED (CHECK MESSAGES)

☞ To start analysis, check that the distilled water container is full and the wastewater container is empty. Check that covers are closed and check that there are cuvettes. Press START.

1202 ANALYSING NOT ALLOWED (START UP NOT DONE)

☞ To start analysis, perform Start up. Press START.

1206 ANALYSING STOPPED (CHECK MESSAGES)

☞ The actual error messages are seen on the MESSAGES window. Perform remedy procedures and continue analysis.

1207 ANALYSING STOPPED (STOP HAS BEEN PRESSED)

☞ To restart analysis, press START.

*) Reinstall the software

1208 START UP NOT ALLOWED (START UP DONE)

☞ Start up is possible to perform after switching on the analyser or after Stand by. Start up is recommended to be done once a day.

1212 START UP NOT ALLOWED (CHECK WATER, CUVETTES AND COVERS)

☞ To perform Start up, check that the distilled water container is full and the wastewater container is empty. Check that covers are closed and check that there are cuvettes.

1213 INSTRUMENT TYPE MISMATCH. SELECT CORRECT TYPE.

☞ Warning that wrong information about the instrument type (20/30/60) detected. Select the correct instrument type from Start: Programs: Instrument selection.

Concerning Konelab 30 and 30i

1214 EXIT FAILED (%u). REMOVE CUVETTE FROM INCUBATOR
- %u MEANS THE INCUBATOR POSITION NUMBER

Cuvette still in the incubator (e.g. the hook has broken) and the analyser has failed to exit it during Stand by or Exit cuvettes (in the Instrument actions) functions.

☞ Wait until analysis is complete. Open the analyser's and incubator's covers and remove the cuvette manually. Refer to section 6.4.2.

Concerning Konelab 60 and 60i

1214 EXIT FAILED (%u). REMOVE CUVETTE FROM INCUBATOR (INSTR. ACTIONS)
- %u MEANS THE INCUBATOR POSITION NUMBER

Cuvette still in the incubator (e.g. the hook has broken) and the analyser has failed to exit it during Stand by or Exit cuvettes (in the Instrument actions) functions.

☞ Wait until analysis is complete. Activate F7, Manual cuvette exit in the Instrument actions window. Open the analyser's cover and remove the cuvette manually. Refer to section 6.4.2.

1215 TOO MANY UNUSABLE CUVETTE POSITIONS IN INCUBATOR.

Several cuvettes have remained in the incubator (e.g. the hook has broken) and the analyser has failed to exit them. Analysis will stop after requests under analysis are completed.

☞ Remove cuvettes with Exit cuvettes in the Instrument actions window or perform Stand by. If the error message 1214 appears remove cuvettes manually. Refer to section 6.4.2.

1216 NO USABLE CUVETTE POSITIONS IN INCUBATOR.

All cuvettes in the incubator are unusable (e.g. the hook has broken) and the analyser has failed to exit them. Analysis will stop after requests under analysis are completed.

☞ With Konelab 60, remove cuvettes with Manual cuvette exit in the Instrument actions window (refer to section 6.4.2.) and after that switch the analyzer off and on.

☞ With Konelab 30 and 20, switch the analyzer off and remove cuvettes manually from the incubator. Refer to section 6.4.2. Switch the analyzer on.

1217 INSTRUMENT TYPE AND TICK LENGTH MISMATCH IN KONELAB.INI

☞ Warning that the instrument type do not match with the tick length. Konelab 30 and 60 are using the tick length of 4.5 seconds and Konelab 20 the tick length of 7 seconds. To continue using the Konelab program, first exit from it by selecting F8/F3 in the Management window. Then select the correct instrument type from Start: Programs: Instrument selection. Finally, start the Konelab program again by clicking the konelab -icon. Note that also in the Configuration window the instrument type is selected.

1218 INVALID INTERNAL TICK VALUE

Warning that the instrument's tick length doesn't match with the original one. Analysing continues.

1999 TIMET ERROR MESSAGE (%u)
- %u MEANS THE ERROR NUMBER

- Software problem. Analysis continues.

6.3.1.3 RESPONSE HANDLER (2 - RH)

2002 FULL MESSAGE QUEUE DETECTED (RH)
2003 MESSAGE QUEUE STAYS FULL (RH)
2004 CANNOT OPEN MESSAGE QUEUE (RH)

☞ Software's internal communication error. Restart the workstation.

2011 CALCULATION ERROR: ZERO DIVIDER (RH)
2012 CALCULATION ERROR: LOG FROM NEGATIVE (RH)
2013 CALCULATION ERROR: TOO HIGH EXPONENT (RH)

Warning that the incorrect initial value for a calculation has been detected. The calculation cannot be done. E.g. calibration is not successful and test's automatic acceptance is changed to manual.

2021 DATABASE LOCK ERROR (RH)

☞ Internal software problem to handle the database. Analysis will stop after requests under analysis are completed. Press START to continue analysis. If the problem persists, restart the workstation. Refer to section 6.4.1.

2022 ERROR WHEN DOING DATABASE OPERATION (RH)
2031 WRONG DATA FROM DATABASE (RH)
2032 WRONG DATA FROM AN OTHER PROCESS (RH)
2033 INTERNAL DATA ERROR (RH)

☞ Warning about internal software problem in the database. Analysis will stop after requests under analysis are completed. Press START to continue analysis. If the problem persists, restart the workstation. Refer to section 6.4.1.

*)

2041 CANNOT OPEN OR READ %S.INI (RH)
2042 CORRUPTED KONELAB.INI (RH)

☞ Warning about problem in the configuration, filter or temperature data. Check the data in the Configuration window. Refer to section 3.8 (Ref. manual). If the problem persists, call service.

2301 REAGENT REGISTER FULL OF VIALS

☞ To have a new reagent, remove one bottle from the reagent disk in the Reagent disk window when analysis is not in progress.

2302 SAMPLE REGISTER FULL OF SEGMENTS

☞ To add a new segment, remove one segment from the sample disk in the Sample segment window when analysis is not in progress.

2303 NO WATER BLANK DATA (RH)

☞ Perform Start up.

2304 NO TEST DATA (RH)

☞ Software error. If the problem persists, restart the workstation. Refer to section 6.4.1.

2305 CANNOT OPEN OR READ ERDATA.TXT (RH)

Erdata.txt includes error messages.

☞ Restart the workstation. Refer to section 6.4.1. If the problem persists reinstall the software for the workstation.

*) Reinstall the software

2306 POOR WATERBLANK MEASUREMENT (%s, SD=mA)
e.g. Poor waterblank measurement 340 nm SD=2.1 mA
i.e. %s means the measured wavelength and
SD=mA means the measured standard deviation

☞ Repeat Start up.

If the problem persists try the following ones:

☞ Possible causes

1. Deteriorated water.
   - Wash the distilled water container at least once a week with spirit and distilled/deionized water. Change water and ensure that it is pure. Repeat water blank in Instrument actions.

2. Dirty cuvettes.
   - Empty the cuvette loader and reload it. Repeat water blank measurement.

3. Photometer error.
   - Check that the lamp is not broken and that it is correctly installed. Refer to section 6.3.2 (Ref.manual)

If the problem persists call service.

2307 REAGENT VIAL HAD AN UNKNOWN BARCODE (%u)
- %u MEANS THE READ BARCODE NUMBER

The barcode id for the reagent is given in the Reagent definition window. The analyser didn't recognise the barcode.

☞ Open the reagent insert cover and remove the vial. Type the barcode id in the Reagent definition window when analysis is not in progress. Insert the reagent again into the analyser.

2308 NO FREE STAT POSITION

☞ To have a new STAT sample, remove one STAT sample from the sample disk in the Sample entry window when analysis is not in progress.

2309 CORRUPTED ERDATA.TXT (RH)

Erdata.txt includes error messages.

☞ Restart the workstation. Refer to section 6.4.1. If the problem persists reinstall the software for the workstation.

2310 NO VALID CALIBRATION

☞ Ask calibration in the Calibration/ QC selection window. After calibration has been accepted, requests are analysed automatically.

2312 DUPLICATE SEGMENT ID (%u)
-%u MEANS THE SEGMENT'S ID NUMBER

Analyser is removing the last inserted segment.

☞ Insert samples into a new segment.

2313 A NEW SEGMENT DETECTED BY INSTRUMENT (%u)
-%u MEANS THE SEGMENT'S ID NUMBER

The user is informed about a new segment. Analysis continues.

2314 UNKNOWN REAGENT VIAL FOUND IN POSITION (%u)
-%u MEANS THE REAGENT'S POSITION

☞ Possible causes

E.g. the user has changed a new reagent disk and the analyser couldn't read the barcode or the reagent data has not been given but the analyser detects the presence of a reagent.
- Open the reagent insert cover and take the vial away. Check that the reagent's data is OK in the Reagent definition window. Check the barcode. Insert the reagent again into the analyser.

2315 REMOVE SAMPLE SEGMENTS MANUALLY

☞ Possible causes

E.g. during transportation all segment positions are full and the segment loader is at the higher position.
- Take the red sample cover away and remove segments manually. Perform 'Check sample disk' in the Sample disk window or boot the instrument. Refer to section 6.4.1. After that the segment loader will work.

2316 Na TEST MUST BE IN USE WHEN RUNNING Li (ISE)

☞ When lithium is measured also sodium must be installed because lithium is measuring not only lithium but also sodium. So the Na+ electrode must be measured to reduce the sodium value. Check that Na is installed in the block and that it is marked to be in the block in the ISE Electrodes window. Refer to section 4.3 (Ref.manual).

2317 LAMP VOLTAGE ADJUSTMENT FAILED (%S)
-%S MEANS THE WAVELENGTH

☞ Perform Start up.

2318 ALL SEGMENTS FOR KUSTI SAMPLING ARE FULL
2319 NO SEGMENT FOR KUSTI SAMPLING IN INSTRUMENT
2325 SEGMENTS FOR KUSTI SAMPLING ARE ALMOST FULL

☞ Insert KUSTI segments.

2320 SAMPLE IS ALREADY IN INSTRUMENT, NO
DISPENSING FROM KUSTI

- Information to the user. Analysing continues.

2322 REFLEX TEST MISSING

- Information to the user. Analysing continues.

☞ To get the reflex test in use, go to the Test definition window and select yes from the 'Test in use' menu.

2323 MISSING KUSTI WASHING SOLUTION

- Warning to the user. Stand by procedures continues. Next time before Stand by procedure, insert Washing solution bottle in KUSTI wash position beside the sample disk. Refer to section 2.5 (Ref.manual)

2324 INTERNAL DATA ERROR

- This is only for service information.

2998 ERROR MESSAGE FROM UNDEFINED PROCESS
2999 RESPONSE HANDLER ERROR MESSAGE (%u)
- %u MEANS THE ERROR NUMBER

- Software problem. Analysis continues.

6.3.1.4 USER INTERFACE (3 - UI)

3002 FULL MESSAGE QUEUE DETECTED (UI)
3003 MESSAGE QUEUE STAYS FULL (UI)
3004 CANNOT OPEN MESSAGE QUEUE (UI)

☞ Software's internal communication error. Restart the workstation. Refer to section 6.4.1.

3011 CALCULATION ERROR: ZERO DIVIDER (UI)
3012 CALCULATION ERROR: LOG FROM NEGATIVE (UI)
3013 CALCULATION ERROR: TOO HIGH EXPONENT (UI)

Warning that the incorrect initial value for a calculation has been detected. The calculation cannot be done. E.g. calibration is not successful and test's automatic acceptance is changed to manual.

3021 DATABASE LOCK ERROR (UI)

☞ Internal software problem to handle the database. Restart the workstation. Refer to section 6.4.1.

3022 ERROR WHEN DOING DATABASE OPERATION (UI)

☞ Warning about internal software problem in the database. Analysis continues. If the problem persists restart the workstation. Refer to section 6.4.1.

3027 CANNOT OPEN DATABASE (UI)

☞ Internal software problem to handle the database. Restart the workstation. Refer to section 6.4.1.

3031 WRONG DATA FROM DATABASE (UI)
3032 WRONG DATA FROM AN OTHER PROCESS (UI)
3033 INTERNAL DATA ERROR (UI)
3034 WRONG DATA FROM AN OTHER WINDOW (UI)

☞ Internal software problem in the database. If problem persists restart the workstation. Refer to section 6.4.1.

3041 CANNOT OPEN OR READ %.INI (UI)
3502 CANNOT OPEN OR READ FILE (UI)

☞ Warning about problem in the configuration, filter or temperature data. Check the data in the Configuration window. Refer to section 3.8 (Ref.manual). If the problem persists, contact service.

3503 UNKNOWN MESSAGE STATUS (UI)
3504 UNKNOWN MESSAGE (UI)

☞ Software problem. Restart the workstation. Refer to section 6.4.1.

3505 CORRUPTED KONELAB.INI (UI)

☞ Warning about problem in the configuration data (konelab.ini). Check the data in the Configuration window. Refer to section 3.8 (Ref.manual)

3506 KONELAB.INI FILE CREATED
3507 KONELAB.INI FILE UPDATED WITH DEFAULT VALUES

The user is informed about the configuration data (konelab.ini) actions.

3508 KONELAB.INI FILE CREATE FAILED
3509 KONELAB.INI FILE UPDATE FAILED

☞ Possible causes	Software problem in the Configuration data (konelab.ini). - Restart the workstation. Refer to section 6.4.1.

3510 INSTRUMENT TYPE MISMATCH BETWEEN DB AND KONELAB.INI

☞ Select the correct instrument type from Start: Programs: Instrument selection.

3511 NOT ENOUGH FREE SPACE ON HARD DISK

☞ Select Start: Programs: Windows NT Explorer and delete unnecessary files. Free at least 50 Mb.

3512 LANGUAGE MISMATCH BETWEEN UI PROCESS AND KONELAB.INI

☞ To continue using the Konelab program, first exit from it by selecting F8/F3 in the Management window. Then select the correct language from Start: Programs: Language selection. Finally, start the Konelab program again by clicking the konelab –icon.

3999 USER INTERFACE ERROR MESSAGE (%u) - %u MEANS THE ERROR NUMBER

- Software problem. Analysis continues.

6.3.1.5 LABORATORY INFORMATION MANAGAMENT SYSTEM (4 - LIMS)

4032 WRONG DATA FROM AN OTHER PROCESS (LIMS)

☞ Internal software problem in the database. Restart the workstation. Refer to section 6.4.1.

4401 SERIAL LINE PARAMETER ERROR (LIMS)

☞ Check the serial interface parameters in the Configuration window. Refer to section 3.8 (Ref. manual).

4402 WRONG SERIAL PORT (LIMS)

☞ Check the serial interface parameters in the Configuration window. Refer to section 3.8 (Ref. manual).

4403 WRITE ERROR (LIMS)
4407 TRANSMISSION ERROR (LIMS)
4409 MESSAGE BUFFER ERROR (LIMS)

External computer has received the data but transmission has been detected as incorrect.

☞ Possible causes: E.g. electronic malfunction, software error, initialisation error or power failure.
Check the cable connection. If the problem persists call service.

4404 READ ERROR (LIMS)

The analyser has received the data but transmission has been recognised as incorrect.

☞ Possible causes: E.g. electronic malfunction, software error, initialisation error or power failure.
Check the cable connection. If the problem persists call service.

4405 SYNCHRONIZATION ERROR (LIMS)

The analyser received a data record[1] while it was expecting an ACK character or it received ACK/NAK while expecting a data record.

☞ Possible causes: E.g. faulty cable, electronic malfunction, software error.
Check the cable connection. If the problem persists call service.

[1] A data record is a string of any characters beginning with ':' and ending with (0D hex) or a string of any characters whose length exceeds the size of input buffer (currently 132).

4406 COMMUNICATION TIMEOUT (LIMS)

External computer did not answer in the allowed time.

☞ Possible causes: E.g. faulty cable, electronic malfunction or wrong initialisation data.
Check the cable connection. If the problem persists call service.

4408 ERROR WHEN DOING DATABASE OPERATION (LIMS)

☞ Warning about internal software problem in the database. Analysis continues. If the problem persists restart the workstation. Refer to section 6.4.1.

4410 LIMS TYPE MISMATCH BETWEEN LIMS PROCESS AND KONELAB.INI

☞ To continue using the Konelab program, first exit from it by selecting F8/F3 in the Management window. Then select the correct LIMS process from Start: Programs: lims selection. Finally, start the Konelab program again by clicking the konelab –icon.

4999 LIMS ERROR MESSAGE (%u)
- %u MEANS THE ERROR NUMBER

- Software problem. Analysis continues.

6.3.2 ERROR MESSAGES COMING FROM THE INSTRUMENT'S PC (5 - INTERNAL PC)

5001 INTERNAL DATA ERROR (INTERNAL PC)

Software error in the internal PC. Another error message details the actual problem, e.g. needle error.

5002 INTERNAL PC ERROR: USED TOO MUCH TIME

The analyser has fallen behind the timetable. It recovers automatically.

5003 INTERNAL PC ERROR: CANNOT SEND CAN-MESSAGE

The internal PC cannot get the message to the board. Analysis will stop.

☞ Possible causes

1. Software problem.
   - Reboot the instrument. Refer to section 6.4.1.
2. Broken PCCAN board or broken recipient board.
   - Call service.

5004 INTERNAL PC ERROR: UNEXPECTED NODE %u BOOT - %u MEANS THE BOARD NUMBER

☞ Possible causes

1. Software problem.
   - Reboot the instrument. Refer to section 6.4.1.
2. Broken board.
   - Call service.

5005 FEEDBACK ERROR WHEN INITIALIZING

Perform water wash (F6 in the Instrument actions window) before continuing. This must be definitely done when Konelab is connected to the automation conveyor, and KUSTI is in ‘not in use’ state.

☞ Possible causes

1. Mechanical obstacle.
   - Check that there are no mechanical obstacles to stop free movement.
2. Too loose cogged belt or broken feedback sensor or damaged motor driving board.
   – Reboot the instrument. Refer to section 6.4.1.
   If problem persists call service.

5006 MIXER NOT RUNNING PROPERLY

This error message is for Konelab 20 and meaning that needle is not mixing properly. Analysing is stopped.

☞ Possible causes

1. An obstacle detected.
   - Remove the obstacle. Press START to continue analysis.
2. Damaged opto / opto cable/ motor driving board.
   - Reboot the instrument. Refer to section 6.4.1.
   If problem persists call service.

5007 MA DISPENSER/ MIXER INITIALIZATION FAILED

☞ Possible causes

1. An obstacle detected.
   - Remove the obstacle. Perform water wash (F6 in the Instrument actions window) before continuing. Water wash must be definitely done when Konelab is connected to the automation conveyor, and KUSTI is in 'not in use' state. Press START to continue analysis.

2. Damaged opto / opto cable/ motor driving board.
   - Reboot the instrument. Refer to section 6.4.1. If problem persists call service.

5007 REAGENT/ SAMPLE REGISTER INITIALIZATION FAILED

☞ Possible causes

1. Mechanical obstacle.
   - Open the cover and check if e.g. some reagent vessel/ sample cup is incorrectly attached. Perform water wash (F6 in the Instrument actions window) before continuing. Water wash must be definitely done when Konelab is connected to the automation conveyor, and KUSTI is in 'not in use' state.

2. Reagent/ Sample disk incorrectly located.
   - Check the location of the reagent/ sample disk and reattach. Refer to section 6.4.3. Perform water wash (F6 in the Instrument actions window) before continuing. Water must be definitely done when Konelab is connected to the automation conveyor, and KUSTI is in 'not in use' state.

3. Damaged opto / opto cable/ motor driving board.
   - Reboot the instrument. Refer to section 6.4.1. If problem persists call service.

5007 CUVETTE PUSHER INITIALIZATION FAILED

☞ Possible causes

1. Mechanical obstacle.
   - Check if some obstacle can be found. Refer to section 6.4.2. Perform water wash (F6 in the Instrument actions window) before continuing.

2. Damaged opto / opto cable or damaged fuse in the motor driving board or damaged motor driving board.
   - Reboot the instrument. Refer to section 6.4.1. If problem persists, call service.

5007 INCUBATOR INITIALIZATION FAILED

☞ Possible causes

1. Cuvette remained in the cuvette path.
   - Check the incubator. Refer to section 6.4.2. Perform water wash (F6 in the Instrument actions window) before continuing.

2. The cuvette arm cogged belt is broken or damaged opto / opto cable/ motor driving board.
   - Reboot the instrument. Refer to section 6.4.1. If problem persists, call service.

5007	FILTER DISK INITIALIZATION FAILED

☞ Possible causes: Damaged opto / opto cable/ motor driving board or mechanical obstacles for the movement e.g. loosen filter
- Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

5008	CAN CARD NOT FOUND

This error message is for Konelab 20. Instrument stays 'Not in use' status.

☞ Possible causes: Loose contact in cable/ broken CAN card inside the workstation's PC.
- Call service.

5009	CUVETTE ARM INITIALIZATION FAILED (MEASUREMENT/ SAMPLE/ REAGENT CHANNEL)

☞ Possible causes:

1. The cuvette waste compartment is full.
   - Empty the cuvette waste compartment and also the cuvette exit channel.
2. The cuvette arm cogged belt is broken or damaged opto / opto cable or the chord of opto has bent down or damaged motor driving board.
   - Reboot the instrument. Refer to section 6.4.1. If problem persists call service.

5010	CAN INITIALIZATION FAILURE

This error message is for Konelab 20. Instrument stays 'Not in use' status.

☞ Possible causes: Software problem.
– Restart the workstation. Refer to section 6.4.1.
If problem persists call service.

5011	CANNOT RECEIVE PACKET FROM INSTRUMENT

Communication fault between the workstation and the analyzer. Typically coming when Konelab 20 has been switched off. Reboot the instrument. Refer to section 6.4.1.

*) →

5014	%S: LIQUID LEVEL DETECTION ERROR

☞ Liquid detected falsely above the surface. Analysis stops. Restart the analyzer. If the problem persists, call service.

Concerning Konelab 30 and 30i

5015	CUVETTE LOADER INITIALIZATION FAILED

☞ Possible causes:

1. An obstacle detected.
   - Remove the obstacle if it is seen in the cuvette loader. Press START to continue analysis.
2. The cogged belt is broken or damaged opto / opto cable/ motor driving board
   - Reboot the instrument. Refer to section 6.4.1. If problem persists call service.

*) Electronic or ground cable error

Concerning Konelab 60 and 60i

5015 CUVETTE LOADER INITIALIZATION FAILED (LATCH/ CUVETTE MOVER/ CUVETTE PUSHER/ ROTATING UNIT)

☞ Possible causes

1. An obstacle detected.
   - Remove the obstacle if it is seen in the cuvette loader. Press START to continue analysis.
2. The cogged belt is broken or damaged opto / opto cable/ motor driving board
   - Reboot the instrument. Refer to section 6.4.1. If problem persists call service.

5016 KUSTI DISPENSER HIT AN OBSTACLE WHILE DISPENSING FROM TRACK

Dispensing continues from the next sample.

☞ Possible causes

Wrong positioning of the tube. The tube is directed to check in the automation line, and the user has to insert it again to the system or to Konelab.

5017 SAMPLE DISPENSER/ SAMPLE MIXER/ REAGENT DISPENSER/ REAGENT MIXER/ ISE DISPENSER/ MA DISPENSER/ MIXER/ KUSTI DISPENSER HIT AN OBSTACLE

☞ Possible causes

1. Probe / Mixer is bent.
   – Check the straightness of the probe / mixer and that it has not fastened into the dispenser's / mixer's cover. To change the probe/ mixer refer to sections 6.3.5. and 6.3.6 (Ref. manual). Perform water wash (F6 in the Instrument actions window) before continuing. This must be definitely done when Konelab is connected to the automation conveyor.
2. An obstacle detected.
   – Remove the obstacle. Perform water wash (F6 in the Instrument actions window) before continuing. This must be definitely done when Konelab is connected to the automation conveyor. Press START to continue analysis.
3. Programmable adjustments have been changed.
   – Reboot the instrument. Refer to section 6.4.1. If problem persists call service.

5018 SEGMENT LOADER DID NOT MOVE CORRECTLY

Possible causes

1. E.g. the user has opened the segment cover while the segment loader has been moving. The segment loader stops.
   - Move the segment loader manually to the lower position and reboot the instrument. Refer to section 6.4.1.

2. An obstacle detected.
   - Remove the obstacle. Move the segment loader manually to the lower position and reboot the instrument. Refer to section 6.4.1.

3. Damaged opto / opto cable/ motor driving board.
   - Reboot the instrument. Refer to section 6.4.1.
   If problem persists call service.

5019 CUVETTE LOADER DID NOT MOVE CORRECTLY

Possible causes

1. An obstacle detected.
   - Remove the obstacle. Press START to continue analysis.

2. Damaged opto / opto cable/ motor driving board.
   - Reboot the instrument. Refer to section 6.4.1.
   If problem persists call service.

5020 CUVETTE CHECK FOUND A DIRTY CUVETTE

The optical quality of every cuvette is checked before use.

Possible causes

Dirty cuvette or bad optical quality of a cuvette.
- Empty the cuvette loader and reload it carefully with clean Konelab cuvettes. Restart analysis.

5021 CUVETTE JAMMED IN LOADER

Possible causes

1. Cuvettes not properly placed in the loader.
   - Open the cover of the cuvette loader. Empty the loader manually. Refill it.

3. Damaged cuvette in the loader.
   - Remove damaged cuvette.

4. Damaged cuvette in the incubator.
   - Remove damaged cuvette. Refer to section 6.4.2.

5022 INSTRUMENT ADJUSTMENT FILE ERROR

Closes connection to the instrument.

Possible causes

Corrupted adjustment file.
- Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

5023 NODE %u SENT WRONG DATA
%u MEANS THE BOARD NUMBER

Software problem. Press Start to continue. If problem persists reboot the instrument. Refer to section 6.4.1.

5024	INTERNAL PC IS OUT OF MEMORY

☞ Software problem. Press Start to continue. If problem persists reboot the instrument. Refer to section 6.4.1.

5025	TEMPERATURE OUT OF RANGE (SAMPLE REGISTER/ REAGENT REGISTER/ MEASUREMENT CHANNEL/ INCUBATOR/ ISE BLOCK/ SAMPLE CHANNEL/ REAGENT CHANNEL)

☞ Possible causes

Broken thermistor / thermal resistor/ thermistor cable.
- Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

5026	NODE %u SENT A WRONG MESSAGE - %u MEANS THE BOARD NUMBER

☞ Software problem. Press Start to continue. If problem persists reboot the instrument. Refer to section 6.4.1.

5027	NODE %u DID NOT BOOT - %u MEANS THE BOARD NUMBER

Closes connection to the instrument.

☞ Reboot the instrument. Refer to section 6.4.1. If the problem persists for the same board call service.

5028	SAMPLE DISPENSER/ SAMPLE MIXER/ REAGENT DISPENSER/ REAGENT MIXER/ ISE DISPENSER/ MA DISPENSER/ MIXER/ KUSTI DISPENSER HIT AN OBSTACLE, CORRECTED AUTOMATICALLY

Automatically performed correction. This is seen when ‘Show all messages’ is on in the Messages window.

5029	NODE %u DID NOT RESPOND - %u MEANS THE BOARD NUMBER

Closes connection to the instrument.

☞ Reboot the instrument. Refer to section 6.4.1. If the problem persists for the same board call service.

5035 SAMPLE DISPENSER/ SAMPLE MIXER/ REAGENT DISPENSER/ REAGENT MIXER/ ISE DISPENSER/ KUSTI DISPENSER INITIALIZATION FAILED

☞ Possible causes

1. An obstacle detected.
   - Remove the obstacle. Perform water wash (F6 in the Instrument actions window) before continuing. Water wash must be definitely done when Konelab is connected to the automation conveyor, and KUSTI is in ‘not in use’ state. Press START to continue analysis.

2. Damaged opto / opto cable/ motor driving board
   - Reboot the instrument. Refer to section 6.4.1. If problem persists call service.

5040 SAMPLE DILUTION VOLUME ERROR, DIL.RATIO %S

☞ Test appears in the Main window to the Invalid tests list with the comment invalid parameter. The analyser is not able to perform the dilution defined by the user. Volume goes over the cell limit, 250 µl. Check the dilution ratios and dispensing volumes used in the test in the Test definition and Test flow windows. Refer first to the section 5.1.7 (Ref. manual) about dispensing.

5044 ISE/ SAMPLE/ REAGENT SYRINGE INIT FAILED

☞ Possible causes

Too stiff mechanics or damaged opto / opto cable / motor driving board
– Perform water wash (F6 in the Instrument actions window) before continuing. This must be definitely done when Konelab is connected to the automation conveyor. Press Start to continue analysis. If problem persists reboot the instrument. Refer to section 6.4.1. If this doesn’t help, call service.

5045 INTERNAL SOFTWARE ERROR (INTERNAL PC)
5046 INTERNAL SOFTWARE ERROR (INTERNAL PC)

☞ Software problem. Press Start to continue. If the problem persists reboot the instrument. Refer to section 6.4.1.

Note that in Konelab 20 there is no internal PC. This software error in Konelab 20 means error in that part of workstation’s software, which is controlling instrument.

5047 CUVETTE FETCH FAILED (%s, POS %u)
- %s means measuring, reagent or sample channel
- pos %u means the incubator position

This is seen when 'Show all messages' is on in the Messages window. No action is needed until the error message '1214 Exit failed. Remove cuvette from incubator (%s)' appears.

☞ Possible causes

1. Damaged cuvette.
- Remove damaged cuvette. Refer to section 6.4.2.

2. Hook in the cuvette arm is not ok.
- Check the hook. Refer to section 6.4.2.

5048 REAGENT REGISTER/ SAMPLE REGISTER/ INCUBATOR POSITION CORRECTED AUTOMATICALLY

Automatically performed correction. This is seen when 'Show all messages' is on in the Messages window.

5049 REAGENT REGISTER/ SAMPLE REGISTER/ INCUBATOR FEEDBACK ERROR

Perform Start up to continue.

☞ Possible causes

1. Mechanical obstacle.
   - Check that the reagent register/ sample register/ incubator can move freely.
2. Too loose cogged belt or broken feedback sensor or damaged motor driving board.
   - Reboot the instrument. Refer to section 6.4.1.
   If problem persists call service.

5058 ISE DISPENSER/ REAGENT DISPENSER/ SAMPLE DISPENSER/ DISPENSER POSITION CORRECTED AUTOMATICALLY

Automatically performed correction. This is seen when 'Show all messages' is on in the Messages window.

5059 ISE DISPENSER/ REAGENT DISPENSER/ SAMPLE DISPENSER/ DISPENSER FEEDBACK ERROR

☞ Possible causes

1. Mechanical obstacle.
   - Check that the dispenser can move freely.
   Perform water wash (F6 in the Instrument actions window) before continuing. This must be definitely done when Konelab is connected to the automation conveyor.

2. Too loose cogged belt or broken feedback sensor or damaged motor driving board.
   - Reboot the instrument. Refer to section 6.4.1.
   If problem persists call service.

5062 SAMPLE TO AIR BOUNDARY NOT FOUND (ISE)

The liquid detector in the ISE block does not find the liquid-air boundary.

☞ Possible causes

1. Short ISE CAL1.
   - Change a new bag of ISE CAL1. Ask calibration in the Calibration/QC selection window and request 'Add ISE CAL1' in the Reagents window.
2. Loose contact between end slices and liquid detection wires.
   - Open the cover of ISE dispensing arm and ensure that the connections are tight.
3. Leakage or clotting in the needle or in the tube. Refer to section 6.4.4.
   - Locate the leakage or clotting and remove the problem.
4. Liquid detection is not working.
   - Reboot the instrument. Refer to section 6.4.1. If problem persists call service.

5063 CUVETTE SENSOR CALIBRATION FAILED (REAGENT/ SAMPLE CHANNEL)

Analysis can be continued.

☞ Possible causes

Damaged cuvette in the incubator (in Konelab 60) or in the loader (in Konelab 30) or dirty or broken cuvette sensor.
- Perform Start up. If problem persists call service to check the situation.

5064 FAILED TO FETCH CUVETTE FROM LOADER

☞ Possible causes

1. Cuvettes not properly placed in the loader.
   - Open the cover of cuvette loader. Empty the loader manually. Refill it.
2. Damaged cuvette in the loader.
   - Remove damaged cuvette.
3. Hook in the cuvette arm is not ok.
   - Check the hook. Refer to section 6.4.2.
4. Poor programmable adjustment or the wrong mechanical height of the cuvette feeder or the mechanics of the cuvette arm doesn't work properly.
   - Reboot the instrument. Refer to section 6.4.1. If problem persists call service.

5065 SYRINGES SHOULD BE ADJUSTED (ADJUSTMENT PROGRAM)

☞ Select Adjustment program in the Instrument actions window and let the analyser perform 'Syringe zero position'. Adjustment is made automatically.

5066 WORKSTATION SENT WRONG DATA

☞ Software problem. Press Start to continue.

5067 SAMPLE/ REAGENT DILUENT PUMP INIT FAILED

☞ Possible causes: Too stiff mechanics or damaged opto / opto cable / motor driving board.
– Perform water wash (F6 in the Instrument actions window) before continuing. This must be definitely done when Konelab is connected to the automation conveyor. Press Start to continue analysis. If problem persists reboot the instrument. Refer to section 6.4.1. If this doesn't help, call service.

Concerning Konelab 60 and 60i

5068 NO CUVETTE FOR WATER BLANK

☞ Possible causes: Damaged cuvette in the incubator.
– Perform Start up.

5999 INTERNAL PC ERROR MESSAGE (%u)
- %u MEANS THE ERROR NUMBER

- Software problem. Analysis continues.

6.3.3 ERROR MESSAGES COMING FROM THE INSTRUMENT'S NODES

6.3.3.1 BOOT - 6

%u means the board number

6001 BOOT %u ERROR: ROM CHECKSUM
6002 BOOT %u ERROR: RAM CHECKSUM
6003 BOOT %u ERROR: FILE CHECKSUM
6004 BOOT %u ERROR: UNABLE TO WRITE EEPROM
6005 BOOT %u ERROR: MCACK NOT RECEIVED
6006 BOOT %u ERROR: NOT IN CONNECTED MODE
6007 BOOT %u ERROR: ILLEGAL DOWNLOAD ADDRESS
6008 BOOT %u ERROR: UNEXPECTED START OF APPLICATION
6009 BOOT %u ERROR: UNKNOWN COMMAND

Closes connection to the instrument.

☞ Possible causes: Broken board.
- Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

6999 BOOT NODE ERROR MESSAGE %u
- %u MEANS THE ERROR NUMBER

- Software problem. Analysis continues.

6.3.3.2 MOTOR - 7

%u means the board number

7001 MOTOR %u ERROR: INCORRECT NODE TYPE

Closes connection to the instrument.

☞ Possible causes

The board is in a wrong position or the board has been configured wrong
- Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

7002 MOTOR %u ERROR: WRONG ACTION
7003 MOTOR %u ERROR: WRONG COMMAND

☞ Software problem. Press Start to continue. If the problem persists reboot the instrument. Refer to section 6.4.1.

7004 MOTOR %u ERROR: AD CONVERTER

A/D converter is not working.

☞ Possible causes

Broken board.
- Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

7006 MOTOR %u FEEDBACK ERROR: DEVICE HAS BEEN MOVED

The user is warned that the device has been moved manually. Analysis continues.

7007 MOTOR %u OVER-CURRENT ERROR

☞ Possible causes

Broken cable/ motor/ board
- Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

7008 MOTOR %u DECODE ERROR

☞ Software problem. Press Start to continue. If the problem persists reboot the instrument. Refer to section 6.4.1.

7024 MOTOR %u ERROR: ILLEGAL CONFIGURATION

Closes connection to the instrument.

☞ Software problem. Reboot the instrument. Refer to section 6.4.1. If problem persists call service.

7100 MOTOR %u ERROR: CAN MESSAGE OVERFLOW

☞ Software problem. Press Start to continue. If problem persists reboot the instrument. Refer to section 6.4.1.

7999 MOTOR ERROR MESSAGE %u
- %u MEANS THE ERROR NUMBER

- Software problem. Analysis continues.

6.3.3.3 PHOTO - 8

8001 PHOTOMETER ERROR: INCORRECT NODE TYPE

Closes connection to the instrument.

☞ Possible causes: The board is in a wrong position or the board has been configured wrong
– Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

8002 PHOTOMETER ERROR: WRONG COMMAND
8003 PHOTOMETER ERROR: AD CONVERTER NOT CALIBRATED

☞ Software problem. Perform Start up.

8004 PHOTOMETER ERROR: CHOPPER IS NOT MOVING
8005 PHOTOMETER ERROR: TOO LOW CHOPPER SPEED
8006 PHOTOMETER ERROR: TOO HIGH CHOPPER SPEED

☞ Possible causes: Broken cable in the chopper motor or the chopper motor doesn't work
– Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

8007 PHOTOMETER ERROR: CHOPPER NOT RUNNING

☞ Software problem. Perform Start up. If the problem persists reboot the instrument. Refer to section 6.4.1.

8008 PHOTOMETER ERROR: MEASUREMENT TIMEOUT

☞ Possible causes: Broken PHOTO board.
– Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

8009 PHOTOMETER ERROR: ILLEGAL PARAMETER

☞ Software problem. Perform Start up.

8011 PHOTOMETER ERROR: SUSPICIOUS SIGNAL GAIN
8012 PHOTOMETER ERROR: SUSPICIOUS REFERENCE GAIN

The adjustment of lamp voltage cannot be done in a certain wavelength.

☞ Possible causes

1. Wrongly installed lamp.
   - Check the installation. Refer to section 6.3.2 (Ref. manual).

2. Broken lamp.
   - Replace the lamp. Refer to section 6.3.2 (Ref. manual).

3. Broken PHOTSIG or PHOTREF or PHOTO boards or cables.
   - Reboot the instrument. Refer to section 6.4.1. If problem persists call service.

8013 PHOTOMETER ERROR: ADBUSY-SIGNAL NOT FOUND
8014 PHOTOMETER ERROR: MEASUREMENT SYNC.

☞ Possible causes

Broken PHOTO board.
– Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

8015 PHOTOMETER ERROR: LAMP IS OFF
8017 PHOTOMETER ERROR: SOFTWARE ERROR
8018 PHOTOMETER ERROR: CHOPPER CONTROL

☞ Software problem. Reboot the instrument. Refer to section 6.4.1.

8019 PHOTOMETER ERROR: TOO LOW SIGNAL RESULT
8020 PHOTOMETER ERROR: TOO HIGH SIGNAL RESULT
8021 PHOTOMETER ERROR: TOO LOW REFERENCE RESULT
8022 PHOTOMETER ERROR: TOO HIGH REFERENCE RESULT

☞ Possible causes

1. Wrongly installed lamp.
   - Check the installation. Refer to section 6.3.2 (Ref. manual).

2. Broken lamp.
   - Replace the lamp. Refer to section 6.3.2 (Ref. manual).

3. Broken PHOTSIG or PHOTREF or PHOTO boards or cables.
   - Reboot the instrument. Refer to section 6.4.1. If problem persists call service.

8023 PHOTOMETER WARNING: NO SIGNAL

The warning that no signal detected for some request, e.g. the absorbance is so high. The result is turned to manual acceptance.

8024 PHOTOMETER ERROR: ILLEGAL CONFIGURATION

☞ Software problem. Reboot the instrument. Refer to section 6.4.1. If problem persists call service.

8025 PHOTOMETER ERROR: ILLEGAL COMMAND

☞ Software problem. Perform Start up.

8026 PHOTOMETER ERROR: INNER AD CONVERTER

☞ Possible causes

The PHOTO board is broken.
– Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

8027 PHOTOMETER LAMP IS BROKEN

☞ Replace the lamp. Refer to section 6.3.2 (Ref. manual).

8028 PHOTOMETER ERROR: NEGATIVE REFERENCE RESULT

☞ Possible causes

1. Wrongly installed lamp.
   - Check the installation. Refer to section 6.3.2 (Ref. manual).
2. Broken lamp.
   - Replace the lamp. Refer to section 6.3.2 (Ref. manual).
3. Broken PHOTSIG or PHOTREF or PHOTO boards or cables.
   - Reboot the instrument. Refer to section 6.4.1.
   If problem persists call service.

8100 PHOTOMETER ERROR: CAN MESSAGE OVERFLOW

☞ Software problem. Press Start to continue. If problem persists reboot the instrument. Refer to section 6.4.1.

8999 PHOTOMETER ERROR MESSAGE (%u)
- %u MEANS THE ERROR NUMBER

- Software problem. Analysis continues.

6.3.3.4 ISE - 9

9001 ISE-NODE ERROR: INCORRECT NODE TYPE

Closes connection to the instrument.

☞ Possible causes: The board is in a wrong position or the board has been configured wrong.
- Reboot the instrument. Refer to section 6.4.1.
  If problem persists call service.

9003 ISE ERROR: TOO LOW DVM DETECTED (%s)
9004 ISE ERROR: TOO HIGH DVM DETECTED (%s)
- %s MEANS THE ELECTRODE'S NAME

☞ Possible causes:

1. Loose contact between an electrode pin and an electrode cap.
- Press from the sides of the cap of the signal wire.

2. Dirty electrode.
- Wash with washing solution in Stand by and give ISE Prime solution in Start up.

3. Aged electrode.
- Change the electrode. Refer to section 6.3.8 (Ref. manual).

4. Poisoned electrode.
- Wash extensively with serum.

5. If all slices give too low or too high DVM most probably filling solution is missing from the reference electrode.
- Fill the reference electrode. Check the electrode pin and change if needed. Refer to section 9.6.2 (Ref. manual).

6. Damaged reference electrode (all slices give too low or too high DVM).
- Change a new reference electrode. Refer to section 6.3.8 (Ref. Manual).

7. Damaged ISEAMP board or cable.
- Reboot the instrument. Refer to section 6.4.1.
  If problem persists call service.

9005 ISE-NODE ERROR: MEASUREMENT TIMEOUT

☞ Possible causes: Electronic or software problem.
- When 'Running' message has disappeared, press START to continue. If the problem persists reboot the instrument. Refer to section 6.4.1.
In case rebooting is not helping call service.

9006 ISE-NODE ERROR: NO IONS CONFIGURED

☞ Software problem. Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

9007 ISE-NODE ERROR: LIQUID DETECTOR NOT RUNNING

☞ Software problem. Reboot the instrument. Refer to section 6.4.1.

9008 ISE-NODE ERROR: LIQUID DETECTOR TIMEOUT

☞ Possible causes

1. Loose contact between an electrode pin and an electrode cap.
- Press from the sides of the cap of the signal wire.

2. Dirty electrode.
- Wash with washing solution in Stand by and give ISE Prime solution in Start up.

3. Aged electrode.
- Change the electrode. Refer to section 6.3.8 (Ref. manual).

4. Poisoned electrode.
- Wash extensively with serum.

5. Filling solution is missing from the reference electrode.
- Fill the reference electrode. Check the electrode pin and change if needed. Refer to section 9.6.2 (Ref. manual).

6. Damaged reference electrode.
- Change a new reference electrode. Refer to section 6.3.8 (Ref. manual).

7. Damaged ISEAMP/ ISE board or cable.
- Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

9010 ISE-NODE ERROR: MEASUREMENT TIMEOUT

☞ Possible causes

Electronic or software problem.
- When 'Running' message has disappeared, press START to continue. If the problem persists reboot the instrument. Refer to section 6.4.1.
In case rebooting is not helping call service.

9011 ISE-NODE ERROR: WRONG COMMAND
9012 ISE-NODE ERROR: ILLEGAL PARAMETER

☞ Software problem. Perform Start up. If the problem persists reboot the instrument. Refer to section 6.4.1.

9013 ISE-NODE ERROR: SELFTEST; ISE AD GROUND
9014 ISE-NODE ERROR: SELFTEST; ISE AD REFERENCE
9015 ISE-NODE ERROR: SELFTEST; LIQUID DETECTOR
9016 ISE-NODE ERROR: SELFTEST; LIQUID DETECTOR

☞ Possible causes

Damaged ISEAMP/ ISE board.
- Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

9024 ISE-NODE ERROR: ILLEGAL CONFIGURATION

☞ Software problem. Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

9100 ISE-NODE ERROR: CAN MESSAGE OVERFLOW

☞ Software problem. Press Start to continue. If problem persists reboot the instrument. Refer to section 6.4.1.

9999 ISE-NODE ERROR MESSAGE (%u)
-%u MEANS THE ERROR NUMBER

- Software problem. Analysis continues.

6.3.3.5 INOUT - 10

%u means the board number

10 001 IO-NODE %u ERROR: INCORRECT NODE TYPE

Closes connection to the instrument.

☞ Possible causes — The board is in a wrong position or the board has been configured wrong
– Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

10 002 %s COMMUNICATION ERROR
10 003 %s TIMEOUT
10 004 %s COMMUNICATION ERROR

☞ Possible causes — The barcode reader is broken or damaged cable connection or cable or IO board
– Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

10 006 IO-NODE %u ERROR: BARCODE READER CONFIGURATION

☞ Software problem. Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

10 007 IO-NODE %u ERROR: ILLEGAL PARAMETER

☞ Software problem. Press Start to continue. If the problem persists reboot the instrument. Refer to section 6.4.1.

10 008 IO-NODE %u ERROR: SENSOR SELFTEST

Some sensor is giving a poor signal for a moment.

☞ Possible causes — Software problem.
- Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

10 009 IO-NODE %u ERROR: WRONG COMMAND

☞ Software problem. Press Start to continue. If the problem persists reboot the instrument. Refer to section 6.4.1.

10 010 IO-NODE %u ERROR: AD CONVERTER TIMEOUT

☞ Possible causes

1. Software/ electronic problem.
   - Reboot the instrument. Refer to section 6.4.1. If problem persists call service.

10 024 IO-NODE %u ERROR: ILLEGAL CONFIGURATION

☞ Software problem. Reboot the instrument. Refer to section 6.4.1. If problem persists call service.

10 100 IO-NODE %u ERROR: CAN MESSAGE OVERFLOW

☞ Software problem. Press Start to continue. If problem persists reboot the instrument. Refer to section 6.4.1.

10 999 IO-NODE ERROR MESSAGE (%u)
- %u MEANS THE ERROR NUMBER

- Software problem. Analysis continues.

6.3.3.6 TEMP - 11

%u means the board number

11 001 TEMP-NODE %u ERROR: INCORRECT NODE TYPE

Closes connection to the instrument.

☞ Possible causes

The board is in a wrong position or the board has been configured wrong.
- Reboot the instrument. Refer to section 6.4.1. If problem persists call service.

11 002 TEMP-NODE %u ERROR: INNER AD CONVERTER

☞ Possible causes

The TEMP board is broken.
- Reboot the instrument. Refer to section 6.4.1. If problem persists call service.

11 003 TEMP-NODE %u ERROR: TOO LOW SUPPLY VOLTAGE
11 004 TEMP-NODE %u ERROR: TOO HIGH SUPPLY VOLTAGE

☞ Possible causes

1. A power failure has occurred and the instrument is working with batteries. The voltage of batteries is too low.
   – Wait until the mains have returned. Reboot the instrument. Batteries are charged automatically.

2. An accidental disturbance in the supply voltage of instrument.
   – Reboot the instrument. Refer to section 6.4.1.

11 005 TEMP-NODE %u ERROR: FUSE BROKEN

☞ Reboot the instrument. Refer to section 6.4.1. If problem persists call service.

11 006 HEATING RESISTOR SHORTCIRCUIT (%s)
11 007 HEATING RESISTOR SHORTCIRCUIT (%s)
- %s MEANS THE POSITION, E.G. INCUBATOR

☞ Possible causes

Broken resistor or cable.
- Reboot the instrument. Refer to section 6.4.1.
  If problem persists call service.

11 008 HEATING RESISTOR WIRE BROKEN (%s)
11 009 HEATING RESISTOR WIRE BROKEN (%s)
%s MEANS THE POSITION, E.G. INCUBATOR

☞ Possible causes

Broken resistor or cable.
- Reboot the instrument. Refer to section 6.4.1.
  If problem persists call service.

11 010 TEMP-NODE %u ERROR: THERMISTOR VOLTAGES

It is usual that also the error message 11 005 is occurring at the same time.

☞ Possible causes

The thermistor short-circuits.
- Reboot the instrument. Refer to section 6.4.1.
  If problem persists call service.

11 011 TEMP-NODE %u ERROR: WRONG COMMAND
11 012 TEMP-NODE %u ERROR: ILLEGAL PARAMETER

☞ Software problem. Perform Start up. If the problem persists reboot the instrument. Refer to section 6.4.1.

11 013 HEATING RESISTOR OVERCURRENT (%s)
11 014 HEATING RESISTOR OVERCURRENT (%s)
- %s MEANS THE POSITION, E.G. INCUBATOR

☞ Possible causes

Broken resistor or cable.
- Reboot the instrument. Refer to section 6.4.1.
  If problem persists call service.

11 015 TEMP-NODE %u: UNKNOWN ERROR

- Software problem. Analysis continues.

11 016 THERMISTOR ERROR (%s)
11 017 THERMISTOR ERROR (%s)
11 018 THERMISTOR ERROR (%s)
11 019 THERMISTOR ERROR (%s)
11 020 THERMISTOR ERROR (%s)
11 021 THERMISTOR ERROR (%s)
- %s MEANS THE POSITION, E.G. INCUBATOR

☞ Possible causes

The thermistor wire is broken.
- Reboot the instrument. Refer to section 6.4.1.
  If problem persists call service.

11 024 TEMP-NODE %u ERROR: ILLEGAL CONFIGURATION

☞ Software problem. Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

11 025 TEMP-NODE %u ERROR: AD CONVERTER ERROR
11 026 TEMP-NODE %u ERROR: AD CONVERTER ERROR
11 027 TEMP-NODE %u ERROR: AD CONVERTER ERROR

☞ Possible causes: Damaged TEMP board.
- Reboot the instrument. Refer to section 6.4.1. If problem persists call service.

11 100 TEMP-NODE %u ERROR: CAN MESSAGE OVERFLOW

☞ Software problem. Press Start to continue. If problem persists reboot the instrument. Refer to section 6.4.1.

11 999 TEMP-NODE ERROR MESSAGE (%u)
- %u MEANS THE ERROR NUMBER

- Software problem. Analysis continues.

6.3.3.7 POWCAN - 12

12 001 POWCAN-NODE ERROR: INCORRECT NODE TYPE

Closes connection to the instrument.

☞ Possible causes: The board is in a wrong position or the board has been configured wrong
- Reboot the instrument. Refer to section 6.4.1. If problem persists call service.

12 002 POWCAN-NODE ERROR: AD CONVERTER NOT RUNNING
12 003 POWCAN-NODE ERROR: AD CONVERTER TIMEOUT

☞ Possible causes: Software/ electronic problem.
- Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

12 004 POWCAN-NODE ERROR: 2.5V REF RANGE

☞ Possible causes: The reference voltage of the POWCAN board is damaged.
- Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

12 005 POWCAN-NODE ERROR: COOLING FUSE BROKEN

☞ Reboot the instrument. Refer to section 6.4.1. If problem persists call service.

12 006 THERMISTOR SHORTCIRCUIT (%s)
12 007 THERMISTOR WIRE BROKEN (%s)
%s MEANS COOLING OBJECT: SAMPLE OR REAGENT DISK

☞ Possible causes: Broken thermistor or cable.
- Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

12 008 PELTIER OVERCURRENT (%s)
%s MEANS COOLING OBJECT: SAMPLE OR REAGENT DISK

☞ Possible causes

Broken Peltier or cable.
- Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

12 009 POWCAN-NODE ERROR: BATTERY LOADING

☞ Possible causes

Damaged cables in the battery or damaged POWCAN board.
- Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

12 011 POWCAN-NODE ERROR: WRONG COMMAND
12 012 POWCAN-NODE ERROR: ILLEGAL PARAMETER

☞ Software problem. Perform Start up. If the problem persists reboot the instrument. Refer to section 6.4.1.

12 013 POWCAN-NODE ERROR: CAN-BUS VOLTAGE
12 014 POWCAN-NODE ERROR: CAN-BUS VOLTAGE

☞ Warning about a voltage error in the CAN bus. Reboot the instrument. Refer to section 6.4.1. If problem persists call service.

12 015 BATTERY VOLTAGE IS TOO LOW

☞ Possible causes

A power failure has occurred and the instrument is working with batteries. The voltage of batteries is too low. Analysis is stopped in a controlled manner.
- Wait until the mains have returned. Reboot the instrument. Refer to section 6.4.1. Batteries are charged automatically.

12 016 PELTIER WIRE BROKEN

☞ Possible causes

Broken Peltier.
- Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

12 017 POWCAN-NODE ERROR: POWFAIL-SIGNAL IS ACTIVE

Wrong information of power failure.

☞ Possible causes

Loose cable connection/ broken POWCAN board.
- Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

12 018 POWCAN-NODE ERROR: RELAY CONTACT IS BROKEN

☞ Possible causes

Relay contact of battery is broken.
- Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

12 019 POWCAN-NODE ERROR: BATTERY FUSE OR CABLE IS BROKEN

☞ Possible causes

Battery fuse or cable is broken.
- Reboot the instrument. Refer to section 6.4.1.

If problem persists call service.

12 020 - 12 021 POWCAN-NODE ERROR: BATTERY CHARGING DOESN'T WORK

☞ Possible causes

Batteries are out of condition/ broken POWCAN board.
- Reboot the instrument. Refer to section 6.4.1.

If problem persists call service.

12 022 POWCAN-NODE ERROR: BATTERY IS BROKEN

☞ Possible causes

Batteries are out of condition/ broken POWCAN board.
- Reboot the instrument. Refer to section 6.4.1.

If problem persists call service.

12 023 POWCAN-NODE ERROR: -5V VOLTAGE IS TOO LOW

☞ Possible causes

Broken cable/ POWCAN board.
- Reboot the instrument. Refer to section 6.4.1.

If problem persists call service.

12 024 POWCAN-NODE ERROR: ILLEGAL CONFIGURATION

☞ Software problem. Reboot the instrument. Refer to section 6.4.1.
If problem persists call service.

12 025 POWCAN-NODE ERROR: +12V VOLTAGE IS TOO LOW

☞ Possible causes

Broken cable/ POWCAN board.
- Reboot the instrument. Refer to section 6.4.1.

If problem persists call service.

12 026 POWER FAILURE. BATTERIES ARE SWITCHED ON

- For the user information: Power failure has started and batteries have been switched on.

12 027 POWER FAILURE IS OVER

- For the user information: Power failure is over.

12 100 POWCAN-NODE ERROR: CAN MESSAGE OVERFLOW

☞ Software problem. Press Start to continue. If problem persists reboot the instrument. Refer to section 6.4.1.

12 999 POWCAN-NODE ERROR MESSAGE (%u)
- %u MEANS THE ERROR NUMBER

- Software problem. Analysis continues.

6.3.4 ERROR MESSAGES COMING FROM REPORTS (13 - Report)

13 032 WRONG DATA FROM AN OTHER PROCESS (REPORT)

☞ Internal software problem in the database. If the problem persists restart the workstation and reboot the instrument. Refer to section 6.4.1.

13 601 ERROR WHEN DOING DATABASE OPERATION (REPORT)

☞ Warning about internal software problem in the database. Analysis continues. If the problem persists restart the workstation and reboot the instrument. Refer to section 6.4.1.

13 602 COMMAND BUFFER ERROR (REPORT)
13 603 SAMPLE BUFFER ERROR (REPORT)
13 604 PATIENT BUFFER ERROR (REPORT)

☞ Software problem. If the problem persists restart the workstation and reboot the instrument. Refer to section 6.4.1.

13 605 ERROR IN REPORT.INI FILE

☞ Some problem in Special report format. Refer to section 3.11 (Ref. manual). Report formats. Check your own report format, with F1 you can set all to default format and start to format the report again.

13606 NO PRINTER INSTALLED

Warning during switching on, that the printer drivers are missing.

☞ Install the printer when analysing is not going on.

13 999 REPORT ERROR MESSAGE (%u)
- %u MEANS THE ERROR NUMBER

- Software problem. Analysis continues.

6.4 REMEDY PROCEDURES

6.4.1 RESTARTING THE WORKSTATION AND REBOOTING THE INSTRUMENT

6.4.1.1 To restart the workstation

☞ Exit from the Konelab program in the Management window with F8/F3.

☞ Shut down the computer (the button Start: Shut down in the left corner of the window).

☞ Restart the computer.

☞ Start the Konelab program: Start: Programs: click the konelab icon.

6.4.1.2 To reboot the instrument

☞ Switch off the mains by turning the mains key to the OFF position at the rear of the analyser.

☞ Switch on the analyser.

Konelab KUSTI equipped with the low current switch

Switching off

In case you have Konelab KUSTI and you cannot reach the main power switch at rear of the analyser, open the left front door and locate the low current switch, turn it in the stand by setting ⏻ and unplug the mains cable to turn the power totally off.

When the low current switch is in the stand by setting, only the boards of analyser and the internal PC are powered off.

– If you take the mains cable off when the low current switch is on, the back-up batteries of the instrument are turned on.

WARNING: The low current switch does not turn power totally off.

You can boot the internal PC by turning the low current switch in the stand by setting and waiting at least one minute before turning it on.

Switching on

With Konelab KUSTI, open the left front door, locate the low current switch, and turn it ON (I). To get the analyser working, both the low current switch and the main power switch at the rear of the analyser must be on.

6.4.2 REMOVING A CUVETTE FROM THE INCUBATOR

Figure 6-2: When removing cuvettes from the incubator in Konelab 60, open the whole top cover and support it with a bearing rod. In Konelab 30 and 20 is only necessary to open the upper cover.

☞ Wait until analysis is complete. With Konelab 60 and 60i select F7, Manual cuvette exit in the Instrument actions window to remove the cuvette to the hole in incubator's wall. Open the cover of the analyser. Refer to Figure 6-2.

☞ In Konelab 30, 30i, 20 and 20i remove the incubator cover screws. Remove a cuvette. There are springs in the separation walls of the incubator slots. Pressing the round end of the spring may help lifting the cuvette from the incubator.

In Konelab 60 and 60i there is no need to open the incubator's covers because the cuvette is directed to the hole in the incubator's wall. Remove a cuvette.

☞ Check the hook of the cuvette arm for visible damage or obstructions.

☞ Reattach the covers of the incubator in Konelab 30, 30i, 20 and 20i.

☞ Close the cover of the analyser.

6.4.3 INSTALLING THE SAMPLE / REAGENT DISK

6.4.3.1 Konelab 60 and 30

Be careful the dispenser is moving when you touch the covers! Wait until the dispenser is back in its position.

SAMPLE DISK

To detach the disk:

☞ Take the cal/ctrl sample disk cover away and lift the red segment cover off.

☞ Lift the segment disk up and out.

To attach the disk:

☞ Locate the segment disk into the disk compartment so that the positioning pin aligns with the hole in the middle of the segment disk.

☞ Open the STAT insert cover, attach the segment cover in its position, close the STAT insert cover.

☞ Set the cal/ctrl disk cover in its position.

Be careful the dispenser is moving when you touch the cover! Wait until the dispenser is back in its position.

REAGENT DISK

To detach the disk:

☞ Take the cover away.

☞ Lift the reagent disk up.

To attach the disk:

☞ Attach the reagent disk into the disk compartment so that the positioning pin aligns with the hole in the middle of the reagent disk.

☞ Open the reagent insert cover, attach the reagent cover in its position, close the reagent insert cover.

6.4.3.2 Konelab 20

REAGENT DISK

To detach the reagent disk:

☞ Take the yellow cover away.

☞ Lift the reagent disk up with the handle.

To attach the reagent disk:

☞ Locate the reagent disk into the disk compartment so that the positioning pin aligns with the hole in the middle of the reagent disk.

☞ Open the reagent insert cover, attach the reagent cover in its position, close the reagent insert cover.

Figure 6-3: When detaching the sample disk in Konelab 20, open the whole dispensing cover. There is a bearing rod to keep the cover up.

SAMPLE DISK

To detach the sample disk:

☞ Open the cover of the analyser. Refer to Figure 6-3. Take the yellow reagent cover off and lift the reagent disk with the handle.

☞ In the middle of the sample disk there are six screws to open.

To attach the sample disk:

Replace the six screws in the middle of the sample disk.

Replace the reagent disk so that the positioning pin aligns with the hole in the middle of the reagent disk. Open the reagent insert cover, attach the reagent cover in its position, close the reagent insert cover.

Replace the analyser cover.

6.4.4 ISE LEAKAGE OR CLOTTING

If the analyser sends a message 5062 'Sample to air boundary not found (ISE)' there can be a clot or leak in the tube or clot in the ISE dispensing needle.

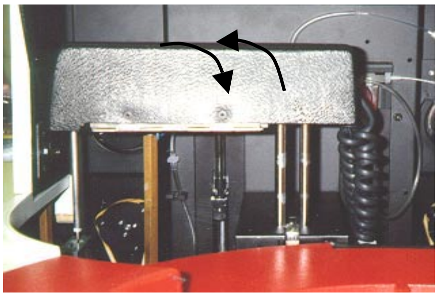


Figure 6-4: Cover of the ISE dispenser arm

CLOT IN THE TUBE

Open the cover of the ISE dispenser arm. The cover is hinged, so it is easy to turn open.

Check visually the needle tube. If there is a clot detach the needle tube from the end slice of the ISE block and the other end of the tube from the needle. Rotate the tube in the fingers and press gently. If necessary, squeeze some ISE CAL1 with a syringe into the tube. Check that the clot disappears.

Connect the tube back: the other end of the tube to the end slice of the ISE block and the other end of the tube to the end of the needle.

CLOT IN THE NEEDLE

To remove a clot, push a piece of metal wire through the needle.

Perform Stand by to wash the needle.

If the problem persists change the needle. The needle packet includes also the needle tube. Refer to section 6.3.5 (Ref. manual).

6.4.5 RECOVERING FROM Konelab DATABASE FAILURE

DB backup should be done each time after changing test parameters or calibrating to prevent loss of entered data in case of a DB failure.
DB backups done with previous Konelab software versions are not compatible with the current version. Take a DB backup after software update. (This applies only to major version updates like 4.0x -> 5.0x, 5.0x -> 6.0x)
Konelab DB can NOT be restored by only copying the database file to the correct location. Use restore procedures located in the Konelab Database Management folder. Note that Konelab program must NOT be running while performing these database procedures.

Symptoms of possible Konelab database failure:

After starting the Konelab program, DB error messages in the main window of Konelab (for example: ”No test data (RH)”).

”DB error” dialogs when entering for example the Test definition window, no data from DB displayed.

Repeating Konelab program crashes or malfunction (this does not always imply a DB failure)

☞ Follow the list until the database works:

1. Restore the latest automatic DB backup. The Konelab DB backup is done automatically every time the user selects ”Clear daily files”. This will mean loss of data changed after previous ”Clear daily files”.
- Exit the Konelab program.
- Select ”Rescue saved DB” from Start – Programs – Konelab Database Management.
- Restart the Konelab program.

2. Restore backup done by ”Save DB” or ”Save DB to CD” or ”Save DB to diskette”.

”Restore saved DB” or ”Restore DB from CD” or ”Restore from diskette” (See previous)

3. Reinstall Konelab DB files and Konelab default database.
- ”Restore Basic DB” (See previous)

If the DB works after this try again to restore some backup (see points 1 and 2).

4. Reinstall the Konelab software from CD.

If you modify the workstation hostname

Hostname of the workstation is included in the DB configuration so it cannot be changed without taking care of the current database.

If you want for some special reason to modify the hostname:

1. Save the DB before any modifications.

2. Modify the hostname.

3. Run "Restore Basic DB".

4. Restore the saved DB.

6.4.6 DISPENSER/ MIXER POSITIONS OF Konelab 20, 30 AND 60

The parameter #1 in error messages 'xx dispenser/ mixer hit an obstacle' is the dispenser/mixer position as follows:

0. Phi drive level position
1. Resting position
2. Wash position
3. Extra wash position
4. Waste position
5. Wash position on reagent side
6. Extra wash position on reagent side
7. Waste position on reagent side
8. Needle check position
9. Outer segment ring, sample cup
10. Inner segment ring, sample cup
11. Stat ring, sample cup
12. Std/ctrl ring
13. Outer segment ring, sample tube
14. Inner segment ring, sample tube
15. Stat ring, sample tube
16. Reagent plate position
17. Cuvette position 1
18. Cuvette position 2
19. Cuvette position 3
20. Cuvette position 4
21. Cuvette position 5
22. Cuvette position 6
23. Cuvette position 7
24. Cuvette position 8
25. Cuvette position 9
26. Cuvette position 10
27. Cuvette position 11
28. Cuvette position 12
29. Cuvette position 1 in reagent dispensing
30. Cuvette position 2 in reagent dispensing
31. Cuvette position 3 in reagent dispensing
32. Cuvette position 4 in reagent dispensing
33. Cuvette position 5 in reagent dispensing
34. Cuvette position 6 in reagent dispensing
35. Cuvette position 7 in reagent dispensing
36. Cuvette position 8 in reagent dispensing
37. Cuvette position 9 in reagent dispensing
38. Cuvette position 10 in reagent dispensing
39. Cuvette position 11 in reagent dispensing
40. Cuvette position 12 in reagent dispensing
41. KUSTI segment ring 1 (outer ring)
42. KUSTI segment ring 2
43. KUSTI segment ring 3
44. KUSTI segment ring 4
45. KUSTI segment ring 5 (inner ring)
46. KUSTI sample transfer line position

Section 7 Boards

In this chapter first is explained the CAN bus used in Konelab and after that in sections 7.2 - 7.14 boards in alphabetical order. Refer also to the cable chart in chapter 3.

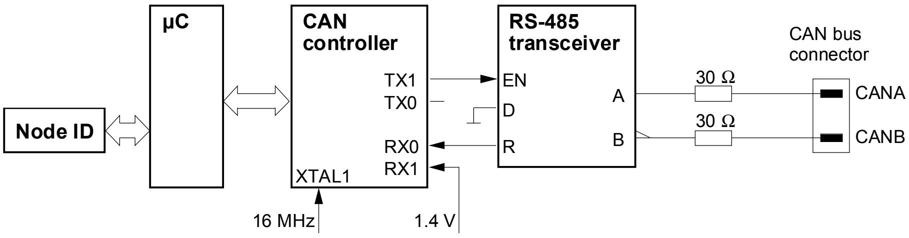
7.1 CAN Bus

Konelab uses the CAN (Controller Area Network) bus to integrate many micro controller nodes into one communication network inside an instrument. This CAN bus follows the Bosch CAN Standard 1.0.

CAN bus used in Konelab is using RS-485 type transceivers in each node connected to a twin cable, and running at bit rate of 615 kbit/s.

7.1.1 CAN Hardware

The essential hardware components of a CAN node for communication on the CAN bus are shown in the figure below.



The micro controller (μC) reads the node identifier (Node ID) from mother board coding depending on the node board situation. Then the μC initializes the CAN controller chip, after which the node starts communication through the CAN bus. The CAN controller is an Intel 82527. A standard RS-485 transceiver chip of type "75176" is used as the physical interface to the CAN bus wires. However, the RS-485 transceiver chip should have a fast transmitter enable (EN) operation; for example, a Texas Instruments SN75ALS176 and a National Semiconductor DS96176 are suitable.

The CAN controller transmits the serial bit stream of a CAN message on its TX1 pin. The initialisation prepares the output driver such that the TX1 has inverted polarity. The RS-485 transceiver is used in a special way (not the standard RS-485 way) to make the two required CAN bus states: "dominant" and "recessive". The TX1 signal is connected to the EN (enable) input of the transceiver, enabling the RS-485 transmitter to drive the data D at its input to the differential outputs A and B when EN is high, or disabling the transmitter by putting its outputs into the high impedance state when EN is low. The data input signal D of the RS-485 transmitter is grounded to hold it at constant D=0 (low). The transceiver bus signals A and B are connected through protective 30 W series resistors to the CAN bus connector. At this point the CAN bus signals are labelled CANA and CANB.

A comparator in the receiver section of the RS-485 transceiver monitors the A and B pins, and outputs the received signal at the R pin as digital data (low/high) to the receive pin RX0 of the CAN controller. The receive pin RX1 of the CAN controller is held at a constant voltage RX1 = 1.4 V, providing a reference voltage to the receive input comparator of the CAN controller.

The CAN signal representation at different points is given in the following tables.

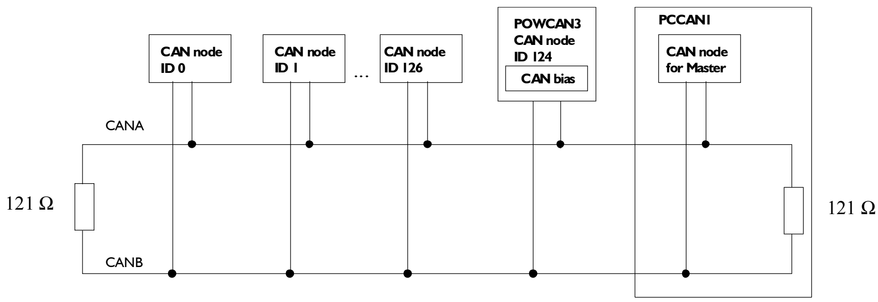
The node itself is sending a CAN message:

Logic CAN state	TX1	R and RX0	RS-485 transmitter	CAN bus voltages
Dominant or 0	1	0 (RX0 < RX1)	Enabled (EN=1), A=0, B=1	CANA < CANB
Recessive or 1	0	1 (RX0 > RX1)	Disabled (EN=0)	CANA > CANB

The node is receiving a CAN message from another node in the CAN network:

Logic CAN state	TX1	R and RX0	RS-485 transmitter	CAN bus voltages
Dominant or 0	0	0 (RX0 < RX1)	Disabled (EN=0)	CANA < CANB
Recessive or 1	0	1 (RX0 > RX1)	Disabled (EN=0)	CANA > CANB

In a CAN network, the CANA and CANB signals of each node are parallel connected to a twin cable, as shown below. The network cable is terminated by
121 W resistors at both ends. Special electronics in the CAN bias block pulls the CAN bus to a proper recessive state when no node transmits a dominant signal, and provides protection against transient over voltages. Thanks to the separate CAN bias block, the CAN nodes themselves do not need an arrangement (usually a system of pull-up and pull down resistors) to effect the recessive state bus voltages.



The network is 'a single master' -based system where the master-node sends commands to other network nodes. All nodes are constantly 'listening to' the message traffic and intercept messages based on the 11-bit CAN-message identifier included in every CAN-message. There may be up to 127 different nodes in the system besides the master node itself. Each node has an ID-number (node ID range: 0…126) of its own. This node ID forms a part of the CAN-message identifier. By including the node ID in the message identifier the master is able to address each network node (node ID) separately.

7.1.2 CAN Timing

The CAN bus in Konelab operates at a bit rate of 615.4 kbit/s. This bit rate corresponds to the bit time of 1.625 µs.

The CAN controller is clocked from a 16 MHz clock signal at its XTAL1 input. This frequency is divided by two in the clock generator of the CAN controller, the resulting 8 MHz giving a system cycle of 0.125 µs. This system cycle is further multiplied by a baud rate prescaler to get the fundamental CAN bit timing cycle, known as the time quantum tQ (or BTL cycle, or tSCL) in the CAN terminology. The baud rate prescaler is determined by the corresponding bits loaded into the Bus_Timing_Register_0 of the CAN controller at initialisation. For the KICAN bus timing, the prescaler is set to 1, so that tQ = 0.125 µs. The other timing parameters in the Bus_Timing_Register_1 are set such that the bit time takes 13 time quanta, or 13ÞtQ = 1.625 µs, giving the bit rate of 615.4 kbit/s.

7.2 CANBIAS 3

CANBIAS3 is a support board for the CAN (Bosch Controller Area Network) bus. It contains a biasing circuit, an over voltage protection circuit and a bus signal diagnostics block for the CAN bus.

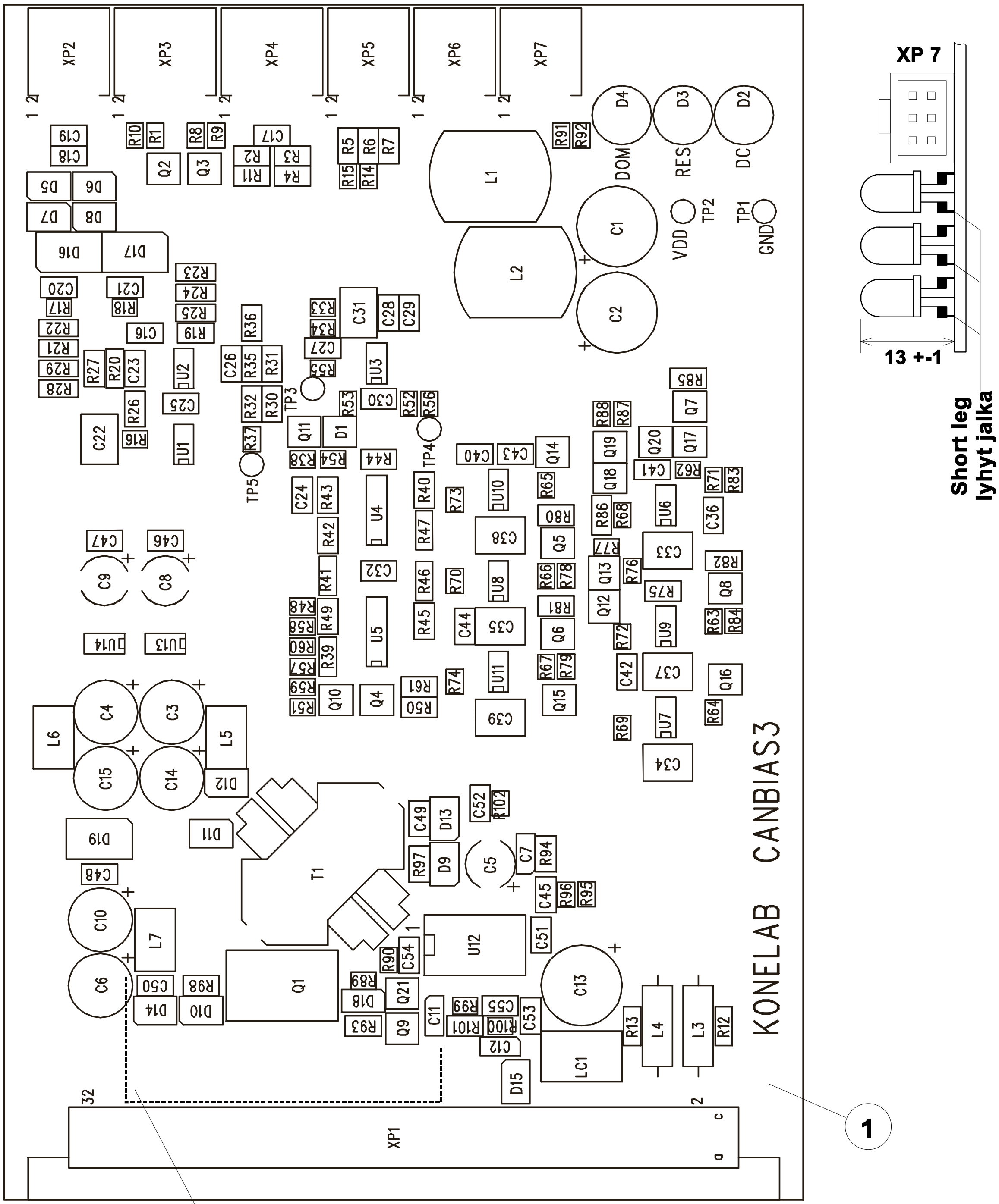
CANBIAS3 is used in board racks especially in analysers that don't have internal PC (Konelab 20). In addition to CAN support it has mixer dc motor filtering and signal splitting for the RS232 from INOUT3. Refer to the cable chart in section 3.

The basic job of the bias circuit is maintaining a proper voltage difference between CANA and CANB lines both in recessive (passive) and dominant (active) states.The biasing current of 15 mA with a 30W series resistor at the RS-485 driver outputs makes the recessive and dominant state voltages equal and at the optimum of 0,9V.

The lines of the CAN bus are protected against over voltage transients by the transient absorbers D16 - D17 and the diodes D5 - D8. This provides sufficient protection to the system against a live board insertion with wrong order of cable connectors. However, the board whose connectors are changed in wrong order is out of protection.

Power Supply

The CANBIAS3 board is powered by a single supply voltage. From this voltage the board generates all other internal voltages it needs.



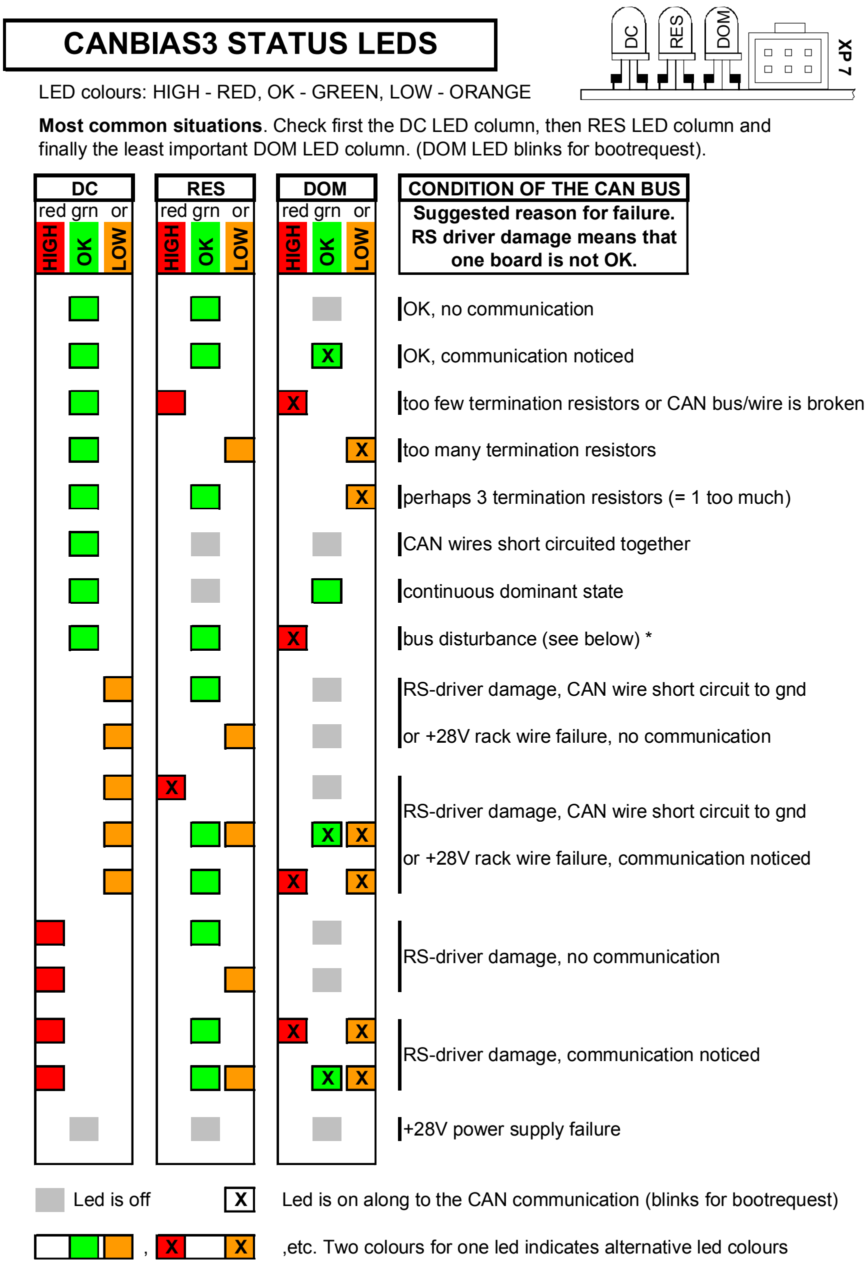
Revisiotarran paikka juotospuolella. Place for revision sticker. on the solder side.

48413448-4172 A

Figure 7-1 THE COMPONENT LAYOUT OF CANBIAS3

7.2.1 CANBIAS3 Led Diagnostics

The status of the CAN bus can be verified by 3 LEDs on the board. The LEDs are of bicolour type capable of showing green, red or orange light. The LED logic is made to get an easily interpreted indication: in OK condition LEDs are always green. In fault cases LED is red or orange, but other colour may shortly flash. Just after turning power on LEDs can be red without any faults.



* Bus disturbance (especially if it isn't continuous) may come from contact problems in the CAN connector of one node, from very heavy communication (many arbitrations) or from a disturbing (damaged) node.

7.3 CONN1-6 and CONN1-8

CONN1 is a connector board for cables. CONN1-6 is for six pin connectors and CONN 1-8 is for eight pin connectors.

CONN1 boards situate in Konelab 60i e.g. in the mixer arms, between cables 143 and 144 from the INOUT board in the cuvette unit, between cables 135 and 136 in the front latch, between cables 141 and 142 in the cuvette pusher, between cables 61 and 62, 59 and 60, 205 and 206, 229 and 207 in the INOUT board in the sample storage, between cables 64 and 65 in the INOUT board in the reagent storage, between cables 17 and 18, 23 and 24, 20 and 21 in the INOUT board in the incubator and dispensing units, between cables 4 and 242 in the measurement channel, between cables 77 and 241 in the lamp house. Refer to the cable chart in section 3.

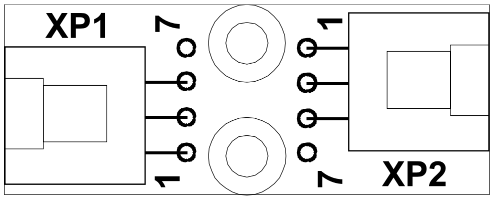


Figure 7-2 THE COMPONENT LAYOUT OF CONN1-6

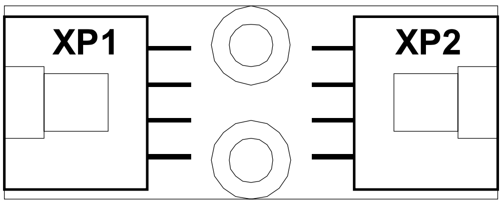


Figure 7-3 THE COMPONENT LAYOUT OF CONN1-8

7.4 INOUT3

INOUT3 is an intelligent input / output (I/O) control board. It fulfils high level commands received from MASTER via CAN bus. The board's CAN bus and power is wired and pcb id-number selected via motherboard.

The board can be divided into basic functions as follows:

- Micro controller & CAN environment for real-time control.
- Inputs of motion limit switches (reflective opto sensors, slotted optical switches mechanical (micro switches etc.)) that do not necessarily have to be connected to the appropriate motor controller (MOTOR3).
- Level detector inputs of waste & water containers (analogue inputs) - the signal is needed since the user must be alerted of the need to add water to or empty a container.
- User panel interface - for LEDs that are needed to indicate when the user can add cuvettes, samples etc.
- RS232 interface for bar code reader that are embedded in the analyser for automated reagent and sample entry. Note that RS232 interface does not provide ±12V for bar code reader, +5V supply is not intended to laser bar code readers (max continuous current 0,3A).

Note that capacitive liquid level detection (needles) is done with the SURF1 board, interfaced to the MOTOR3 board and position feedback encoder input is interfaced only on the MOTOR3 board.

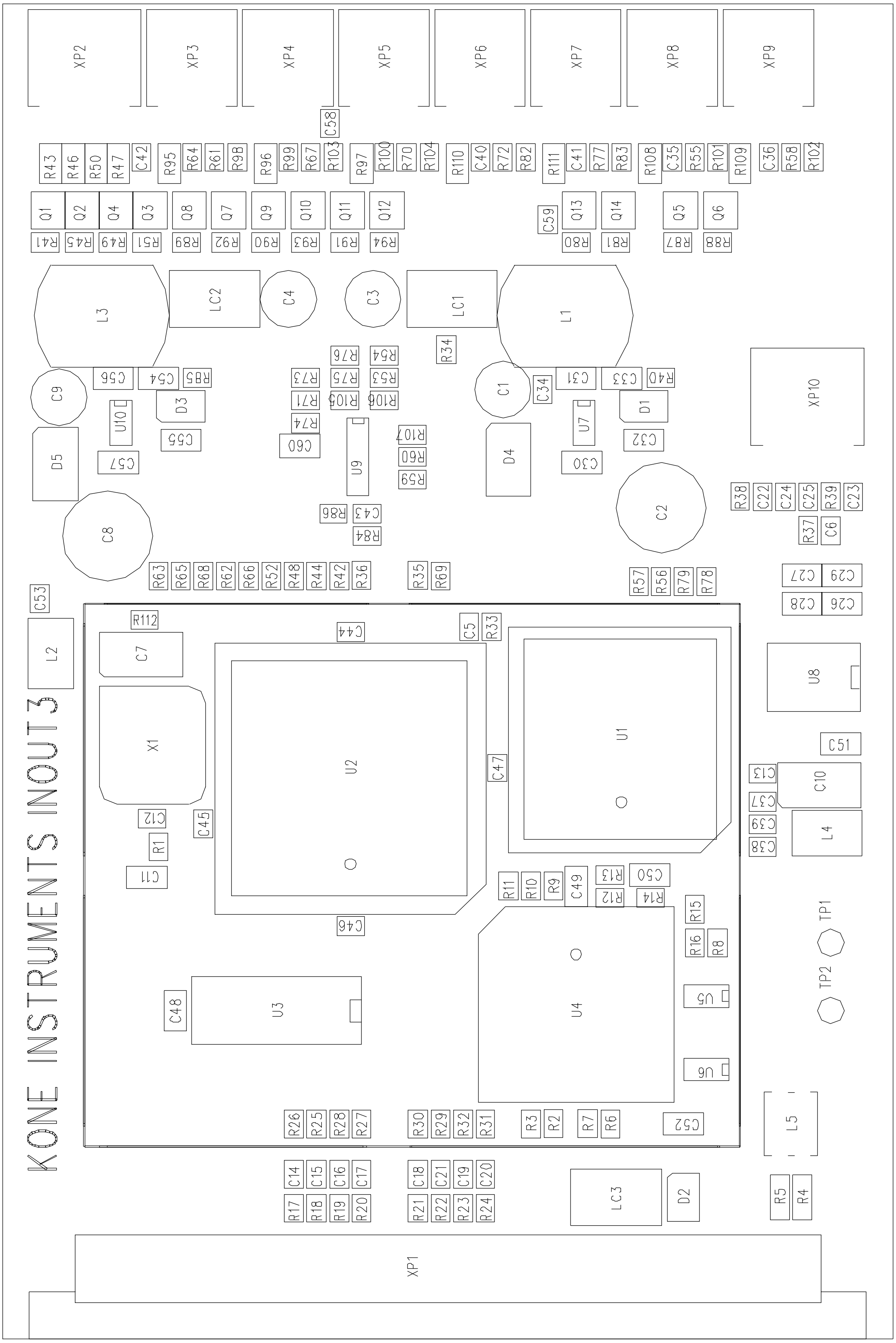


Figure 7-4 THE COMPONENT LAYOUT OF INOUT3

7.5 ISE3 and ISEAMP1

ISE3 and ISEAMP1 boards belong to ISE unit of Konelab models 60i and 30i. The ISE3 board is an intelligent board including the micro controller to control different processes and the CAN interface for data transfer. ISE3 board's CAN bus and power is wired and pcb id-number selected via motherboard.

The ISEAMP board has preamplifiers, a multiplexer and a differential amplifier. It also performs liquid detection.

The ISE board processes the amplified signals coming from the ISEAMP board. It has a 20-bit A/D converter. Furthermore the ISE board controls and measures the liquid detection.

Signal proceeding:	Differential outputs for signal and voltage reference from the ISEAMP board to the A/D converter.
A/D converting:	Sequentially, one SD-type A/D converter is measuring channels multiplexed in the preamplifier.
Voltage range:	-200…+635 mV at electrodes -2.5 …+ 2.5 V at ISE3 input
Linearity:	At least 16 bits (total error referred to the electrode max 15 μV)
Liquid detection:	Measurement of 1 kHz alternating voltage, the result is A/D converted. Impedance limit is fitted according to the block.

MOTOR boards are controlling the syringe and the pump of the ISE unit. The TEMP board is controlling incubation.

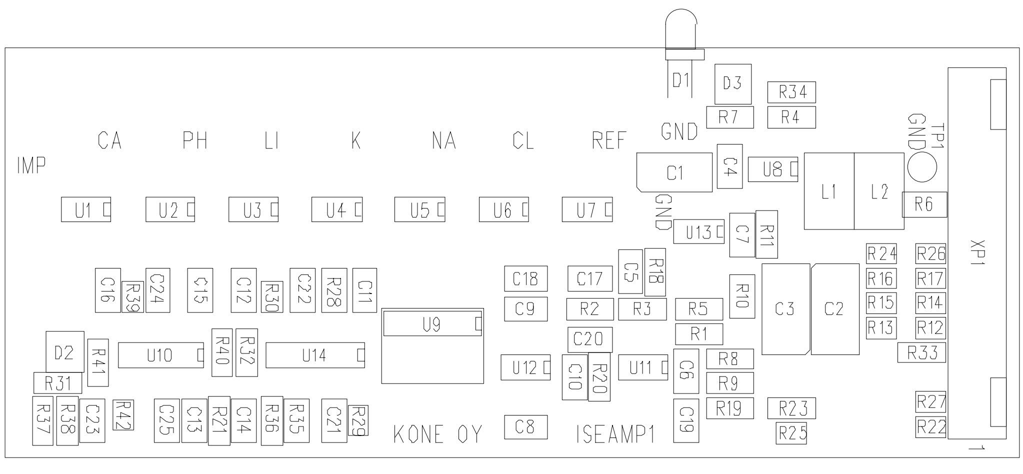


Figure 7-5 THE COMPONENT LAYOUT OF ISEAMP1

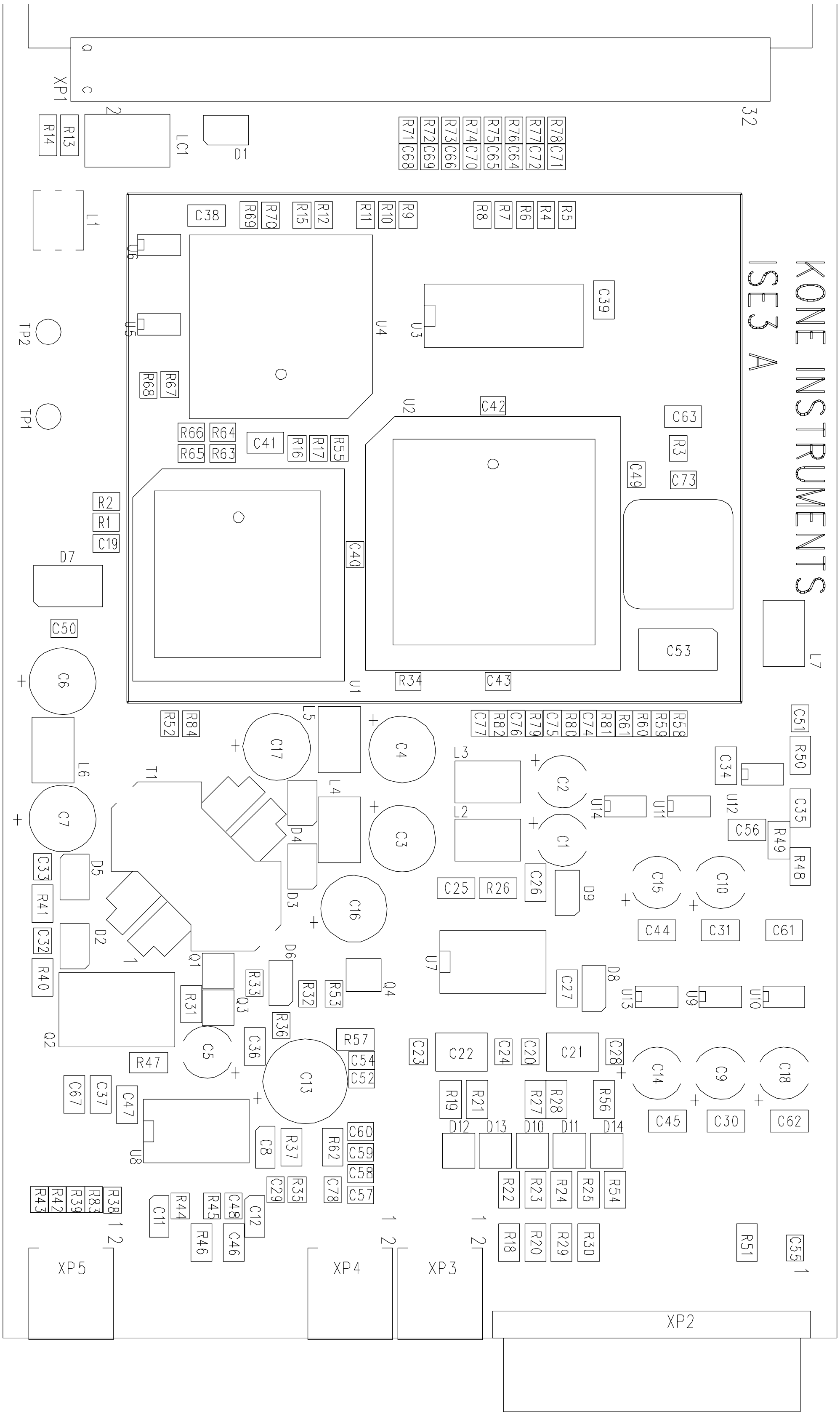


Figure 7-6 THE COMPONENT LAYOUT OF ISE3

7.6 LED1-1, LED1-2 and LED1-3

LED1 board is for LEDs used in the analyser.

LED1-1 is for one bicolour LED. LED1-1 is used in the STAT insert cover and in the reagent insert cover.

LED1-2 is for two LEDs. LED1-2 is used in the segment insert cover and in the cuvette loader.

LED1-3 is similar to LED1-2 (except green and red are vice versa) and used in the cuvette loader in Konelab 20.

To see the positions of LED boards refer to cable chart page 3-24.

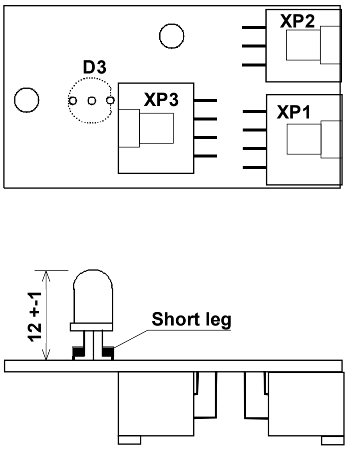


Figure 7-7 THE COMPONENT LAYOUT OF LED1-1

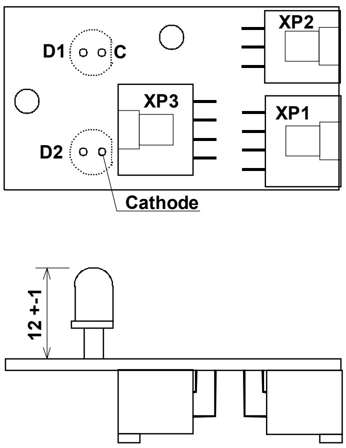


Figure 7-8 THE COMPONENT LAYOUT OF LED1-2 AND LED1-3

7.7 MB1-3 and MB1-9

The motherboard MB1 is a two-layer board placed in the electronic rack back panel. It is holding the power supply +28V and the CAN bus connection and ID-selection of boards. In the beginning of ID, 4 bits are according to the motherboard number and at the end of ID, 4 bits are according to the position of the board. CAN bus connectors are in the both end of the board. The board has no terminal resistors for the CAN bus.

The three slot motherboard is named as MB1-3 and respectively the nine slot motherboard is named as MB1-9.

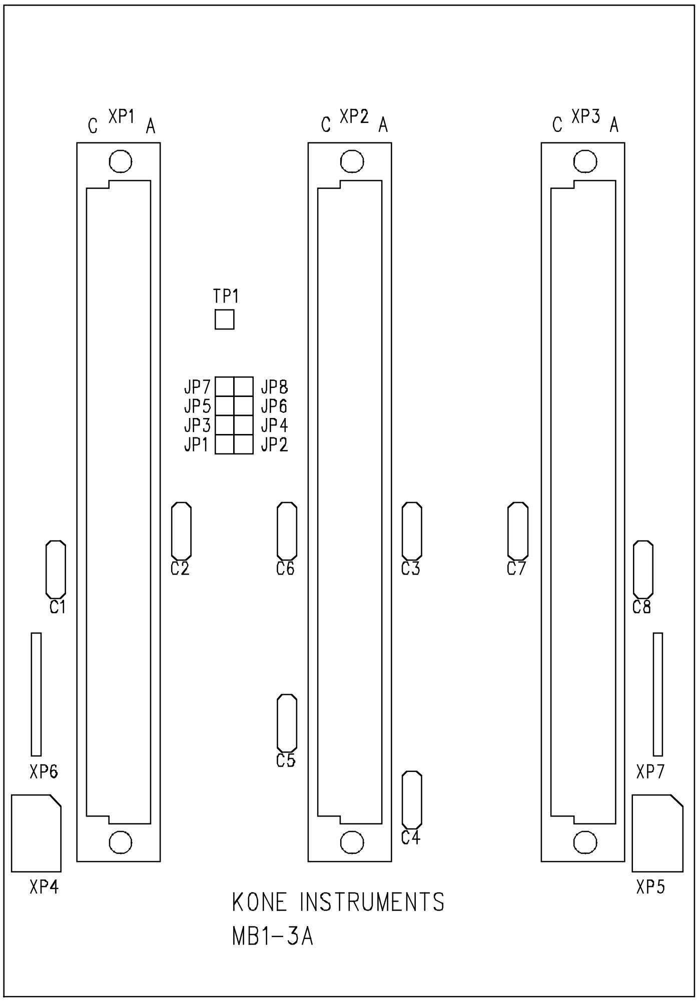


Figure 7-9 THE COMPONENT LAYOUT OF MB1-3

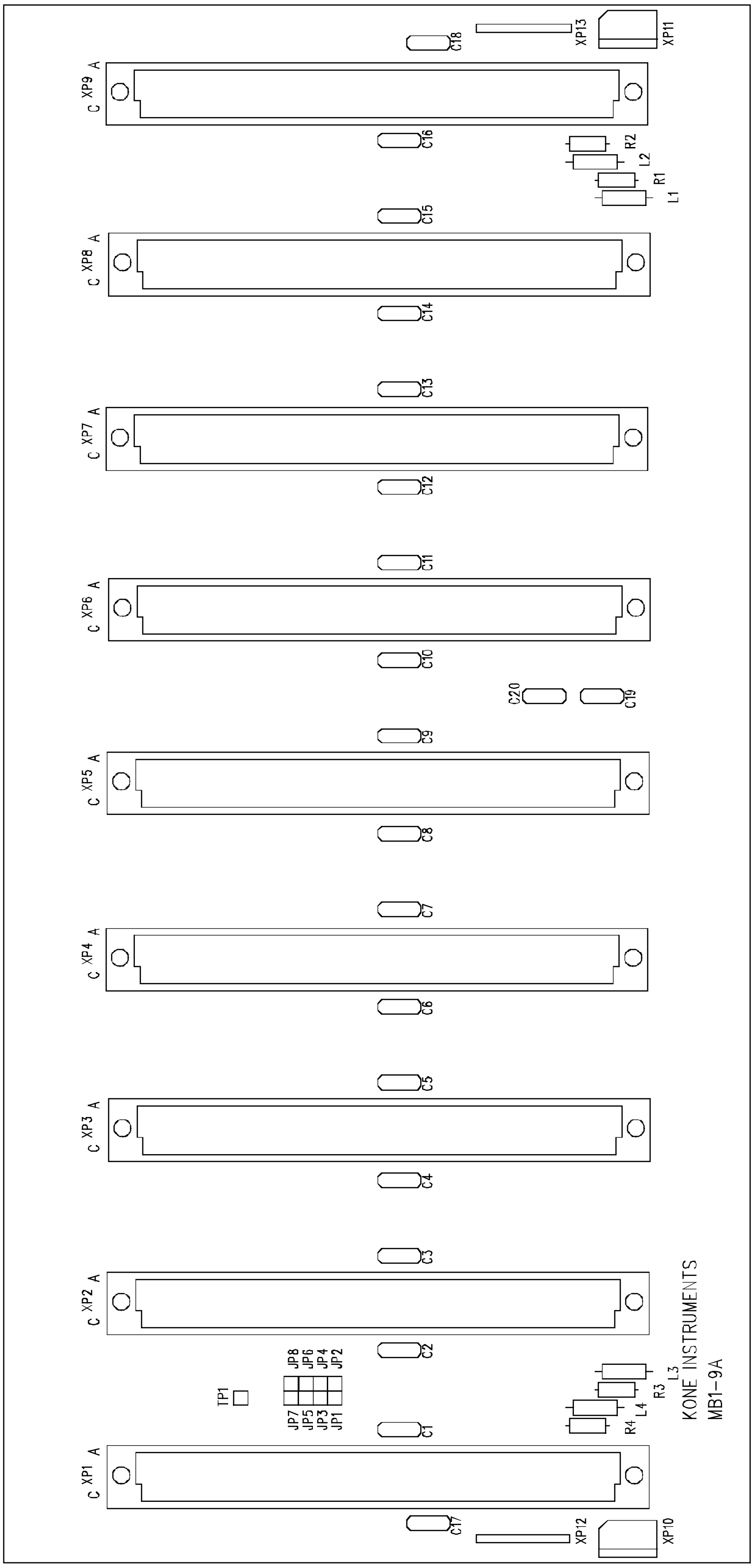


Figure 7-10 THE COMPONENT LAYOUT OF MB1-9

7.8 MOTOR3

The MOTOR3 board is an intelligent motor control board for one stepper motor.
Its micro controller fulfils specified commands received from master via CAN bus.

CAN bus and power wired and pcb id-number selected via motherboard.

Interface for

- 3 (optical or other) limit switches (OPB 980 series),

- one 2-channel incremental opto encoder for position feedback purposes, e.g. HEDS-5000 series or interface for liquid surface detector board (SURF1).

Motor control characteristics

SW controlled motor drive, basic use: bipolar, two phase drive.

Motor types:	Stepper motors
Motor range:	2 ° 100 W, up to 2 A / phase (under certain conditions) +28 VDC
Motor drive resolution:	up to 500 (m)steps / step (depending on motor type)
Motor drive velocity:	up to 5000 pulses / s
Motor wiring:	4 or 8 wire motors, parallel or series connection

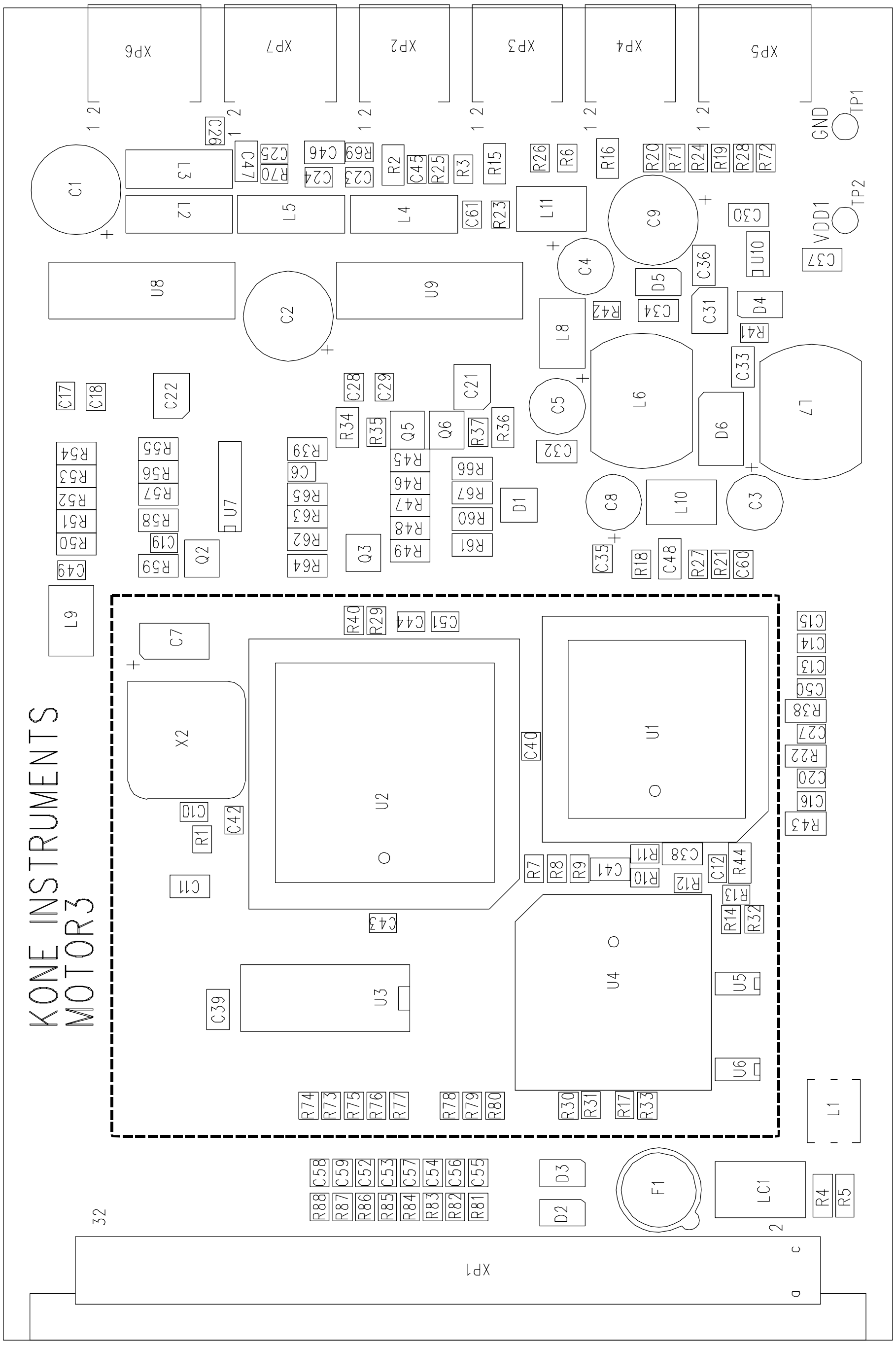


Figure 7-11 THE COMPONENT LAYOUT OF MOTOR3

7.9 PCCAN1

The PCCAN1 board is a CAN board connected to the mother board of the internal PC with 8 bit ISA bus connection. The internal PC is the master of Konelab analyser.

The PCCAN1 board is in the other end of the CAN bus and connected to it. When the message is coming from the CAN bus there is the INT tag in the CAN driver which interrupts the PC. The PCCAN1 board has a terminal resistance of 120 W for the CAN bus and it is shielded against the voltage disturbances caused by connections of boards in the CAN bus.

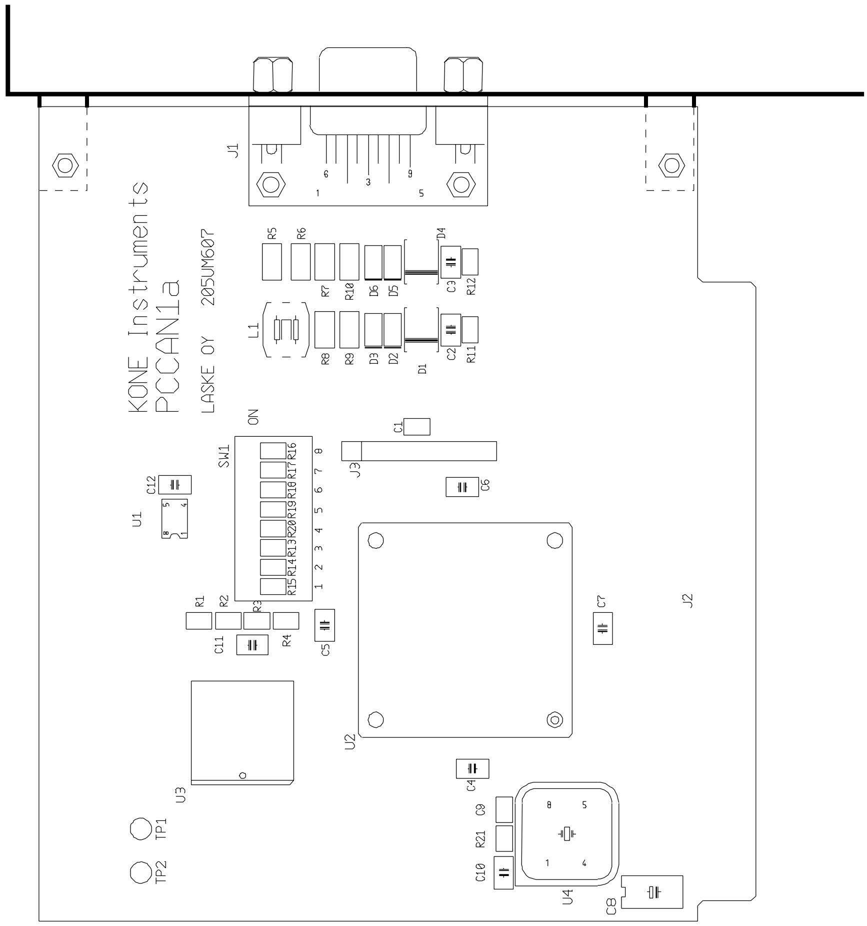


Figure 7-12 THE COMPONENT LAYOUT OF PCCAN1

7.10 PCCAN3

The PCCAN3 card is a PCI-bus based add-on card for PC-computer, that is used for CAN (Controller Area Network) protocol data communication. The card consists of PCI-bus target interface (Xilinx FPGA with LogiCORE PCI32), Intel Full-CAN controller (82527), and CAN physical layer driver circuit (75176).

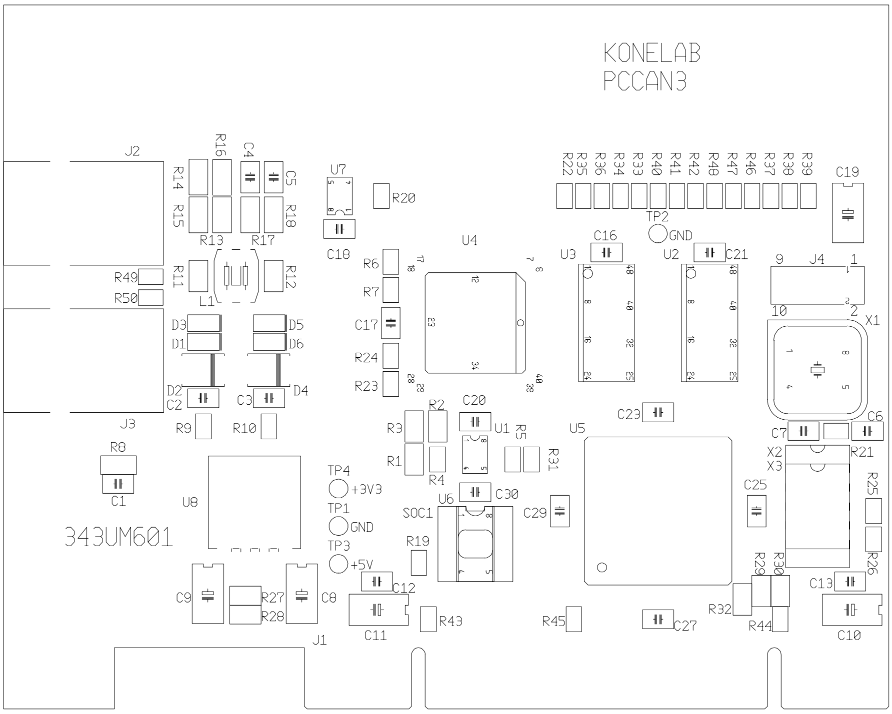


Figure 7-13 THE COMPONENT LAYOUT OF PCCAN3

7.11 PHOTO3, PHOTSIG1 and PHOTREF1

The PHOTO3 board is an intelligent board for controlling the photometer. It includes the micro controller to control different processes and the CAN interface for data transfer.

The photometric functions provided by the PHOTO3 electronics include a lamp power supply, a chopper motor drive, and light detector signal conditioning with AD conversion. Different wavelengths for absorbance measurements are selected by moving the corresponding interference filter into the filter location in the light path. Because the filter wheel, along whose periphery the filters lie, is rotated by a stepper motor, the filter change function is provided by its own stepper motor drive node.

The PHOTO3 lamp power supply is a regulated voltage source for the photometer lamp, designed to drive a halogen lamp with 6 V nominal voltage and 20 W power consumption.

The chopper motor driver is meant to drive a DC motor that rotates a light chopper disk. The chopping frequency is specified at fCHOP = 200 Hz, and is determined by the reference frequency (2 fCHOP = 400 Hz) input to the phase detector in the ASIC. Refer to block diagram below.

To connect the optics of the photometer to the PHOTO3 board there are two preamplifiers for detectors: PHOTSIG1 for the signal detector and PHOTREF1 for the reference detector.

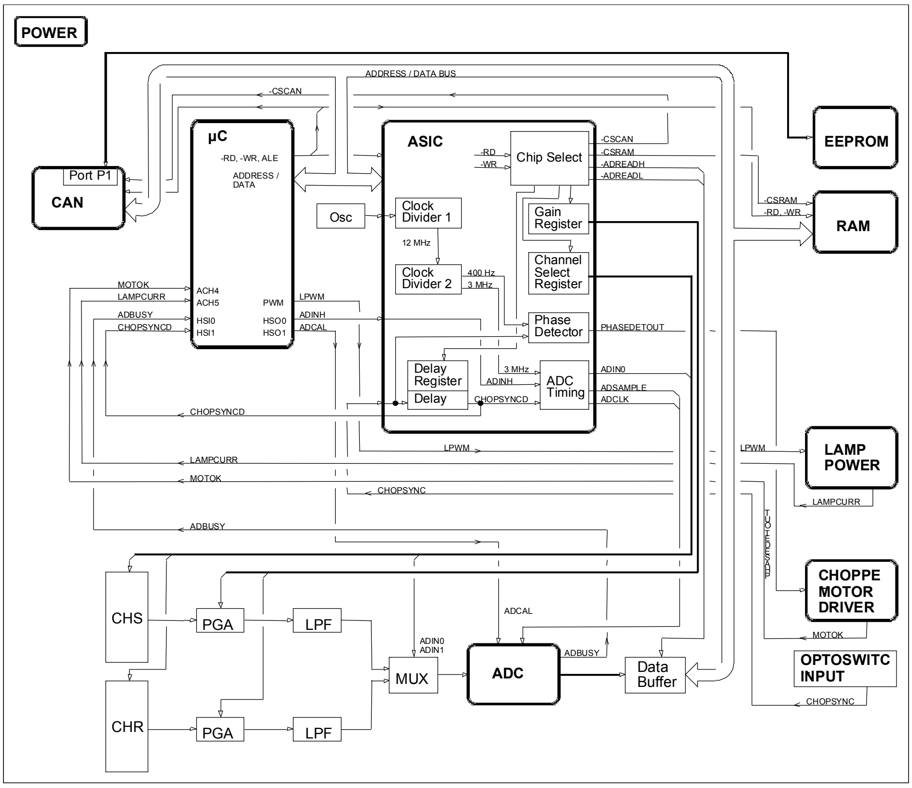


Figure 7-14 THE BLOCK DIAGRAM OF PHOTO3

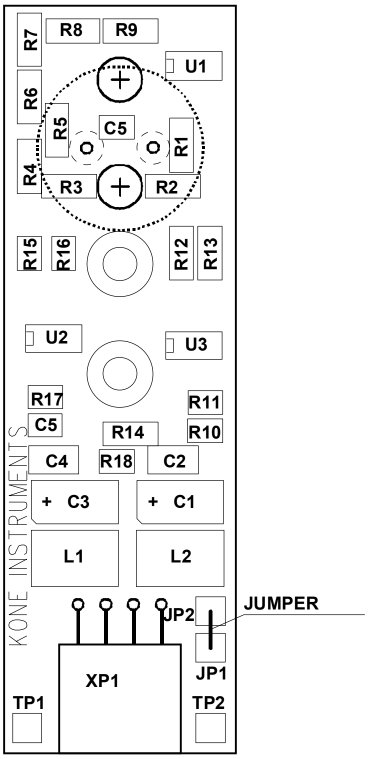


Figure 7-15 THE COMPONENT LAYOUT OF PHOTSIG1

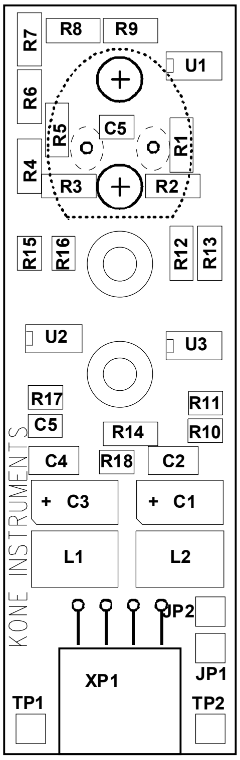


Figure 7-16 THE COMPONENT LAYOUT OF PHOTREF1

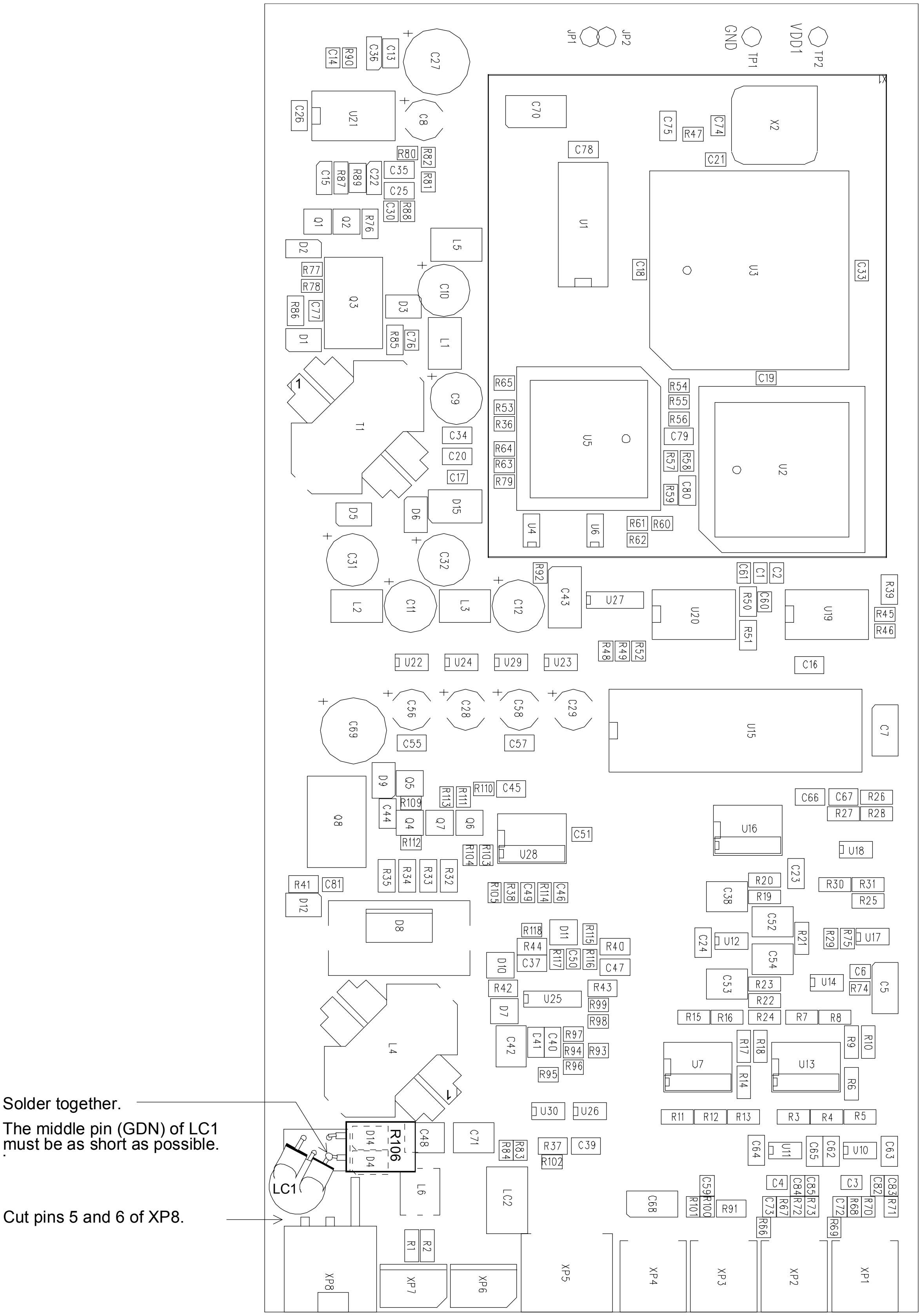


Figure 7-17 THE COMPONENT LAYOUT OF PHOTO3

7.12 POWCAN3

POWCAN3 is an intelligent power supply management and CAN bus support board. It fulfils high level commands received from MASTER via CAN bus.The board can be divided into basic functions as follows:

- Micro controller & CAN environment for real-time control.
- Power supply ±5V and ±12V for Master PC motherboard and ±15V for CAN biasing circuit.
- CAN bus biasing (status state feeds through CAN bus to Master, status indication also by LED which is needed when CAN bus transfer fails) and CAN bus protection.
- Battery management: back up battery charging, back up battery management, +28V during power fail and status of power supply to Master.
- Cooling unit: two control channels with one thermistor per channel, switched mode control for output current (switched mode current drive for peltiers). Controlling cooling on/off, temperature set value and temperature measured value. Diagnosing thermistor fail and output fail.

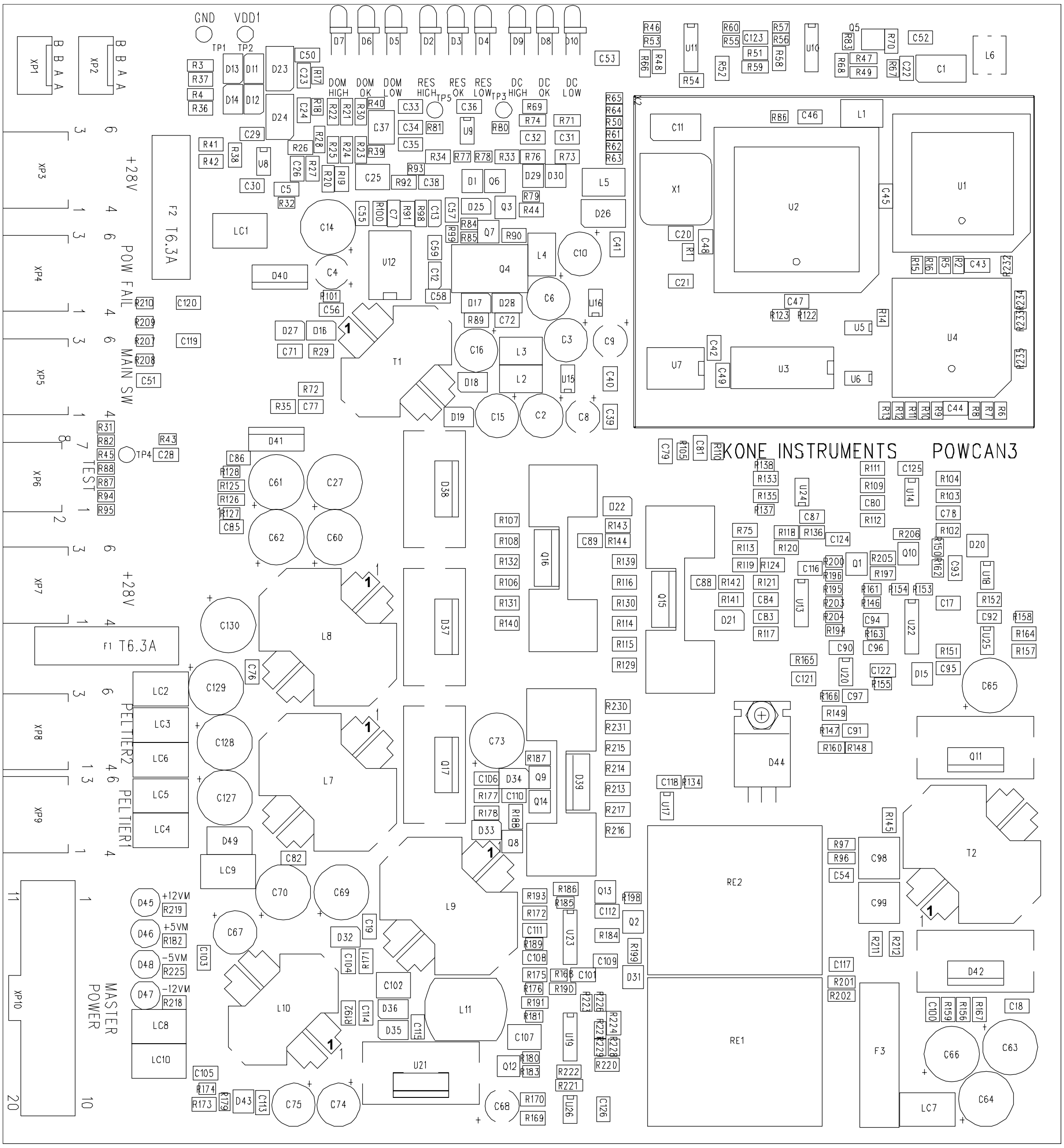


Figure 7-18 THE COMPONENT LAYOUT OF POWCAN3

7.12.1 Powcan3 Led Diagnostics of the Can Bus

The status of the CAN bus can be verified by 9 LEDs on the POWCAN3 board.

- *DC_HIGH, DC_OK and DC_LOW* signals indicate the average voltage of the CAN bus.
- *RES_HIGH, RES_OK* and *RES_LOW* form the recessive state status.
- *DOM_HIGH, DOM_OK* and *DOM_LOW* form the dominant state status.

The most common situations of the CAN bus are listed below.

In the table

"**1**" means that this LED is lit.

"**X**" means that this LED may be on or off.

Leds in the table are in the same order than on the POWCAN3 board.

Check first the appropriate table area according to the DC LEDs group, then for RES LEDs group and finally for the least important group DOM LEDs.

DOM HIGH	**DOM OK**	**DOM LOW**	**RES HIGH**	**RES OK**	**RES LOW**	**DC HIGH**	**DC OK**	**DC LOW**	**CONDITION OF THE CAN BUS**
red	green	**red**	**red**	green	**red**	**red**	green	**red**	Suggested reason for failure
				1			1		**OK**, no communication
	1			1			1		**OK**, communication noticed
X			1				1		too few termination resistors or CAN bus/wire is broken
		X			1		1		too many termination resistors
		1		1			1		perhaps 3 termination resistors
							1		CAN wires short circuited together
	1						1		continuous dominant state
1				1			1		bus disturbance (see below) *
				1	 1			1 1	RS-driver damage, CAN wire short circuit to gnd or +28V rack wire failure, no communication
 1	1 X	 1	X	1 1	 1			1 1 1	RS-driver damage, CAN wire short circuit to gnd or +28V rack wire failure, communication noticed
				1	 1	1 1			RS-driver damage, no communication
 1	1	X	X	1	 1	1 1			RS-driver damage, communication noticed
									+28V power supply failure

*) Bus disturbance (especially if it isn't continuous) may come from contact problems in the CAN connector of one node, from very heavy communication (many arbitrations) or from a disturbing node.

Especially when status LEDs indicate DC LOW or DC HIGH it is good to measure the voltages of CANA and CANB signals by multimeter. Normally CANA is about +2,9V and about CANB +2,1V. Short circuits to ground are easy to find this way.

In many fault conditions CAN communication is possible with an increased amount of errors. However, if any fault is observed some action must be taken.

7.13 SURF1

SURF1 is a board on the dispenser arm intended for liquid surface detection. It utilises a method where a capacitance change causes amplitude modulation in the RC-circuit to which the dispenser needle belongs. The capacitance change is caused by the needle hitting the liquid surface thus facing a different dielectric constant. The analog signal is conducted to the MOTOR3 board where it is converted to digital.

Functions of the board include:

- liquid surface detection of the dispenser arm for sample, reagent and washing
- connection for the measurement thermistor and heating resistor for ISE dispenser arm temperature control
- dispenser arm safety switch interface

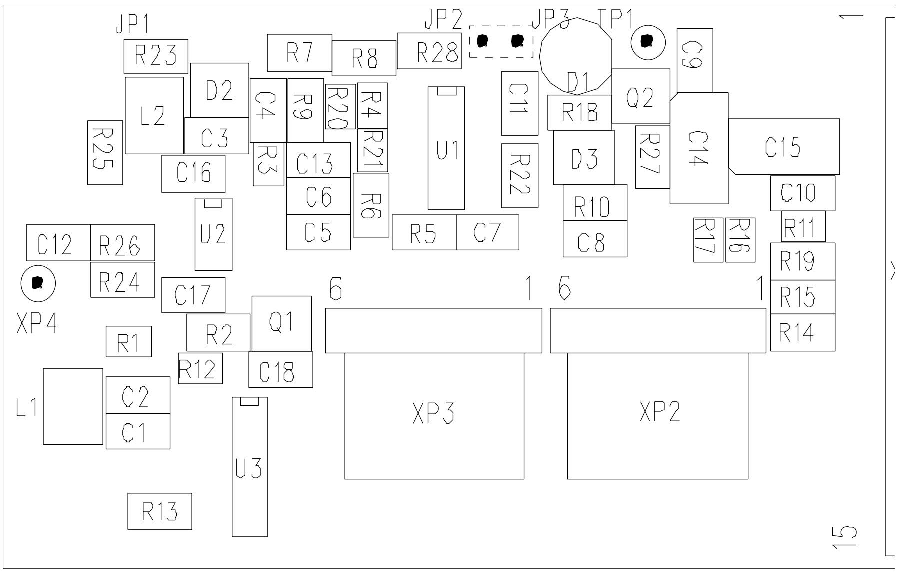
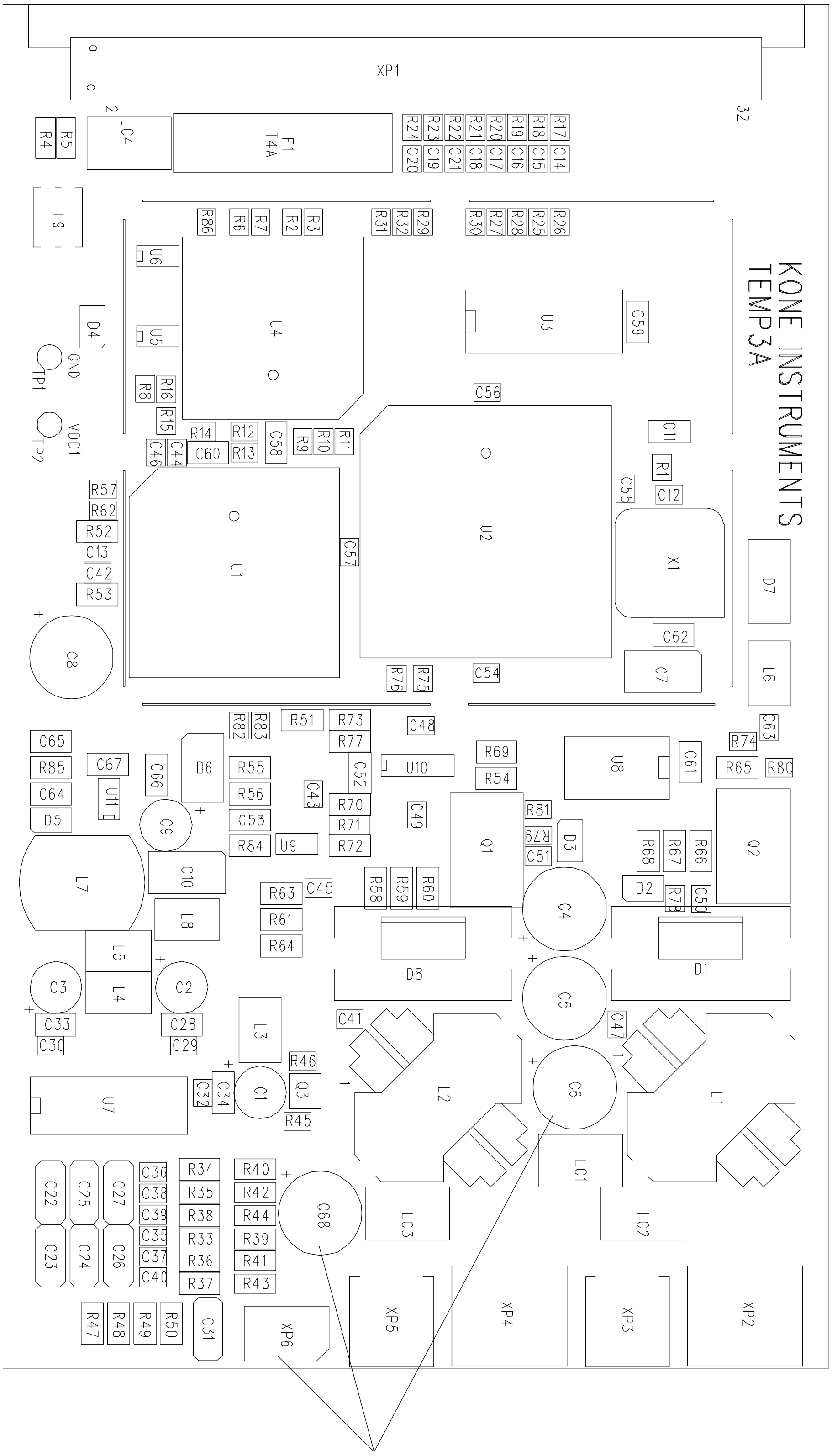


Figure 7-19 THE COMPONENT LAYOUT OF SURF1

7.14 TEMP3

TEMP3 is an intelligent temperature controller board. It contains a CAN bus interface for communication with the analyser central processor and a micro controller for taking care of both the external communication and drive functions for 2 PWM (pulse width modulation) channels. The board's CAN bus and power is wired and pcb id-number selected via motherboard.

- Two channels for temperature control used in the incubator , in the measurement channel and in the ISE arm.
- Six thermistor inputs for temperature control loops and other measurement.
- Optional connection for driving Peltiers via additional board.
- Diagnostic features for thermistor and heating elements open or short circuits.



XP6, C6, C68 ei kalusteta, not used

Figure 7-20 THE COMPONENT LAYOUT OF TEMP3

Section 8 Spare Parts & Consumables

8.1 SPARE PARTS

CODE	ITEM	KI20	KI30	KI60	KUSTI
840058	Barcode reader	X	X	X	
680027	Belt disp/meas channel 420 mm			X	
680049	Belt disp motor unit fii/rotat unit 230 mm	X	X	X	X
680048	Belt disp. Motor unit Y 380 mm	X	X	X	X
680026	Belt driving unit, incub unit 245 mm	X	X	X	
840213	Belt cuv. Pusher 1097,5 mm			X	
680022	Belt incubator unit 330 mm	X	X		
680023	Belt measurement channel 600 mm	X	X		
680018	Belt mover unit 317 mm	X	X		
840505	Cover (main)			X	
840593	Cover (main)		X		
841374	Cover (main)	X			
840634	Cuvette arm	X	X		
840076	Cuvette arm			X	
570264	Fan DC 24V/ 3.6 W	X	X	X	
840020	Feedback sensor with holder	X	X	X	X
841353	Fiber optics 1200 mm (30 kusti)	X			(X)
888681	Fiber optics 650 mm		X	X	
511140	Fuse 20A		X		
511141	Fuse 40A			X	
675506	Gas cylinder 30N		X		
675504	Gas cylinder 35N	X		X	
886087	Interf. Filter 339 nm	X	X	X	
886631	Interf. Filter 365 nm	X	X	X	
886089	Interf. Filter 380 nm	X	X	X	
886093	Interf. Filter 405 nm	X	X	X	
886094	Interf. Filter 450 nm	X	X	X	
886632	Interf. Filter 480 nm	X	X	X	
886095	Interf. Filter 510 nm	X	X	X	
886096	Interf. Filter 540 nm	X	X	X	
886097	Interf. Filter 575 nm	X	X	X	
886098	Interf. Filter 600 nm	X	X	X	
886099	Interf. Filter 620 nm	X	X	X	
886633	Interf. Filter 660 nm	X	X	X	
886100	Interf. Filter 700 nm	X	X	X	
840629	Peltier/ thermistor set (reagent tray)		X	X	
840705	Peltier/ thermistor set (sample tray)		X	X	
888114	Surface detector/ Diluent	X	X	X	
888109	Surface detector/ waste	X	X	X	
840285	Washing unit/ dispenser	X	X	X	X

8.2 UNITS

CODE	ITEM	KI20	KI30	KI60	KUSTI
840078	Channel (dispensing unit)			X	
840088	Channel (measuring unit)			X	
841489	Cooling unit	X			
840233	Cuvette feeder unit			X	
840511	Cuvette loader unit		X		
840221	Cuvette magazine			X	
840239	Cuvette mover unit			X	
840198	Cuvette pusher unit			X	
840214	Cuvette rotation unit			X	
840000	Disp motor unit (without feedback sensor)	X	X	X	X
840070	Incubator disk			X	
841310	Incubator unit	X	X		
841243	Internal PC kit		X	X	
575000	Power unit 1000W			X	
575040	Power unit 300 W	X			
575002	Power unit 600 W		X		
840133	Syringe unit		X	X	
841459	Syringe unit	X			

8.3 PC-BOARDS

CODE	ITEM	KI20	KI30	KI60	KUSTI
841342	CANBIAS	X			
840961	CONNECTION BOARD 1-6	X	X	X	
840956	CONNECTION BOARD 1-8	X	X	X	
840362	INOUT3	X	X	X	
840358	ISE3	X	X	X	
840357	ISEAMP1	X	X	X	
840946	LED-01	X	X	X	
840366	MB1-3A	X	X	X	X
840365	MB1-9A	X	X	X	
840364	MOTOR3	X	X	X	
840356	PHOTO3	X	X	X	
840354	PHOTREF1	X	X	X	
840355	PHOTSIG1	X	X	X	
840361	POWCAN3	X	X	X	
840359	SURF1A	X	X	X	
840363	TEMP3	X	X	X	

8.4 MOTORS

CODE	ITEM	KI20	KI30	KI60	KUSTI
841225	FMI 100 µl pump	X	X	X	X
570114	Motor 1.4A	X	X	X	X
570117	Motor 1.4A	X	X	X	
570116	Motor 1.4A double shaft	X	X	X	X
570118	Motor 1.8A		X	X	
840460	Motor DC-chopper	X	X	X	
840396	Motor latch			X	
841396	Motor mixer	X			
840367	Motor mixer		X	X	
840674	Motor powermax			X	
841458	Peristaltic pump	X			
840131	Peristaltic pump		X	X	

8.5 CABLES

*) thermistor not included

CODE	ITEM	KI20	KI30	KI60	KUSTI
840398	Extension for latch motor 500 mm			X	
840691	Extension for opto 1500 mm		X	X	
840380	Extension for opto 600 mm	X	X	X	
840551	Ground wire 500 mm	X	X	X	X
840392	Heating block cable (ISE)		X	X	
840335	Heating disp/ meas channels*	X	X	X	
840382	Heating foil resistor*			X	
840866	Heating incubator unit*	X	X		
840342	ISEAMP1 – ISE3	X	X	X	
840346	MIXER – MOTOR3		X	X	
840302	Opto cable 620 mm	X	X	X	
840338	Opto dispenser tilt	X	X	X	X
840348	Opto mixer	X	X	X	
840378	Opto reflective sensor	X	X	X	
840417	Opto wide cable 600 mm	X	X	X	
840344	SURF1-MOTOR3		X	X	X
841394	SURF1-MOTOR3/CANBIAS	X			
840340	SURF1-MOTOR3/ TEMP3 (ISE)	X	X	X	
840333	TEMP3-Foil resistor cable*			X	
840847	Thermistor 150 mm	X	X	X	

8.6 SERVICE ACCESSORIES

CODE	ITEM
886655	Adjusting tool set
981614	Lithium grease 200 g
752312	Lubrication oil silicon 50 ml
585202	Silicon paste for peltiers 30 g

8.7 INSTRUCTIONS FOR MOTORS AND BELTS

MOTORS

570114 Motor 1.4 A	
Dispenser / Mixer motor unit Y (vertical)	ALL
Incubator unit	K20 / K30
Measuring channel	K20 / K30 without feedback
Cuvette mover	K60
Cuvette pusher	K60
570116 Motor DS 1.4 A	
Dispenser / Mixer motor unit FII (horizontal)	ALL
Measuring channel	K20Xt and K30 with feedback
Filter wheel	ALL
570117 Motor 1.4 A	
Segment loader	K30 / K60
Measuring channel	K60
Peristaltic pump	K30 / K60
Dispensing channel	K60
570118 Motor 1.8 A	
Driving unit Reagent / Sample disk	ALL
Incubator disk	K60
840674 Motor Powermax	
Rotation unit	K60
Syringe unit	K30 / K60

BELTS

680018 Belt 317mm	
Mover unit	K60
680022 Belt 330mm	
Incubator unit	K20 and K30
680023 Belt 600mm	
Measuring channel	K20 and K30
680026 Belt 245mm	
Driving unit Reagent / Sample disk	ALL
Incubator disk	K60
680027 Belt 420mm	
Dispensing channels	K60
Measuring channel	K60
680048 Belt 380mm	
Dispenser / Mixer motor unit Y (vertical)	ALL
680049 Belt 230mm	
Dispenser motor / Mixer unit FII (horizontal)	ALL
Rotation unit	K60
840213 Belt 1097,5mm	
Cuvette pusher unit	K60

8.8 LIST OF ACCESSORIES AND CONSUMABLES

CODE	START-UP & MAINTENANCE KITS
984001	Start up kit for Kl60 and 30
984002	Start up kit for Kl20
984003	ISE Start up kit (Na, K, Cl) for Kl60i and 30i
984009	ISE Start up kit (Na, K, Cl) for Kl20i
984036	6 Months Maintenance kit for Konelab 20 and 20i
984004	6 Months Maintenance kit for Konelab 30 and 30i
984007	6 Months Maintenance kit for Konelab 60 and 60i
984028	6 Months ISE Complete tubing for Kl20i
984020	6 Months ISE Complete tubing for Kl60i and 30i
984037	12 Months Maintenance kit for Konelab 20 and 20i
984008	12 Months Maintenance kit for Konelab 30 and 30i
984005	12 Months Maintenance kit for Konelab 60 and 60i
984029	12 Months ISE Dispenser kit for Kl20i
984006	12 Months ISE Dispenser kit for Kl60i and 30i
984076	12 Months KUSTI Maintenance kit
981577	Instrument accuracy testing kit
984016	ISE option kit for Kl60 and Kl30
984120	ISE option kit for Kl20

CODE	CONSUMABLES
984000	Acrylic multicell cuvette (40 x 25 pcs)
984068	FMI Pump tubes
984072	Diluent and wash tubes for Konelab 20
984021	Diluent and wash tubes for Konelab 60
984023	Diluent and wash tubes for Konelab 30
984071	Drain/waste tubes for Kl20
984022	Drain/waste tubes for Kl60 and 30
981481	Halogen lamp, EMC model
984070	ISE Complete tubing for Kl20i
984020	ISE Complete tubing for Kl60i and 30i
984069	KUSTI Complete tubing
984012	Mixing paddle
984010	Dispensing needle (reagent/sample)
984011	Dispensing needle ISE
984073	Dispensing needle KUSTI
981276	Piston for 500 µl syringe
984077	Pump tube for Konelab 20 ISE Wash (2 pcs)
980306	Pump tube / PVC/ 2 x grey-grey
981342	Pump tube / ISMAPRENE / 2 x lilac - lilac
984050	Reagent bottle 10 ml (5 pcs)
981456	Reagent vessel 20 ml (14 pcs)
981455	Reagent vessel 60 ml (12 pcs)
989221	Sample cup 2.0 ml (1000 pcs)
989220	Sample cup 0.5 ml (1000 pcs)
984074	Segment holder, KUSTI (1 pc)
984015	Syringe 500 µl grip fix for Kl20

981269	Syringe 500 µl for Kl60 and 30
980993	Waste / diluent canister (1pc)

CODE	**ACCESSORIES**
981351	Adapters for 5 ml reagent tubes (5 pcs)
984060	Software for workstation and internal PC
981548	Printer, Epson LX 300
984043	Printer cable (2,5 m)
984044	Online cable (2,5 m)
980784	Pick-up tool for sample cups
981275	Pick-up tool for primary tubes
984040	Reagent disk, 45 pos.
984041	Sample segment for 5 and 7 ml tubes
984051	Sample segment for 10 ml tubes
984100	Sample segment for KUSTI
984052	Sample disk for 10 ml tubes
984042	Barcode labels for sample segments and sample disk
988018	Tool for tube positioning

CODE	**ELECTRODES**
980845	Reference electrode
981593	K, Maintenance-free, micro volume electrode
981594	Na, Maintenance-free, micro volume electrode
981598	Li, Maintenance-free, micro volume electrode
981595	Ca, Maintenance-free, micro volume electrode
981597	pH, Maintenance-free, micro volume electrode
981596	Cl, Maintenance-free, micro volume electrode
981602	End slices: in and out

CODE	**ISE SOLUTIONS**
984031	ISE Calibrator solution 1 (4 x 400 ml)
984035	ISE Calibrator solutions 2 + 3 (2 x 20 ml + 2 x 20 ml)
984034	ISE Calibrator solution 4 (2 x 20 ml)
984030	Washing solution 4.5% (4 x 20 ml)
980314	Reference electrode solution 5 ml

8.9 CONTENTS OF THE KITS

984002	**START UP KIT for KI20**	
984000	Acrylic multicell cuvette (40 x 25 pcs)	1 pc
989221	Sample cup 2.0 ml (1000 pcs)	1 pc
984050	Reagent bottle 10 ml (5 pcs)	1 pc
981481	Halogen lamp	1 pc
984077	Pump tube / ISE Wash	2 pcs
984030	Washing solution (4 x 20 ml)	2 pcs

984001	**START UP KIT for KI30/60**	
984000	Acrylic multicell cuvette (40 x 25 pcs)	1 pc
989221	Sample cup 2.0 ml (1000 pcs)	1 pc
984050	Reagent bottle 10 ml (5 pcs)	1 pc
981481	Halogen lamp	1 pc
981342	Pump tube / ISMAPRENE / 2 x lilac-lilac	1 pc
984030	Washing solution (4 x 20 ml)	2 pcs

984009	**ISE START UP KIT (Na, K, Cl) for KI20i**	
980845	Reference electrode	1 pc
981593	K, Maintenance-free, micro volume electrode	1 pc
981594	Na, Maintenance-free, micro volume electrode	1 pc
981596	Cl, Maintenance-free, micro volume electrode	1 pc
984031	ISE Calibrator solution 1 (4 x 400 ml)	1 pc
984035	ISE Calibrator solutions 2 + 3 (2 x 20 ml + 2 x 20 ml)	1 pc
984077	Pump tube / ISE Wash	2 pcs
984030	Washing solution (4 x 20 ml)	1 pc

984003	**ISE START UP KIT (Na, K, Cl) for KI30i and 60i**	
980845	Reference electrode	1 pc
981593	K, Maintenance-free, micro volume electrode	1 pc
981594	Na, Maintenance-free, micro volume electrode	1 pc
981596	Cl, Maintenance-free, micro volume electrode	1 pc
984031	ISE Calibrator solution 1 (4 x 400 ml)	1 pc
984035	ISE Calibrator solutions 2 + 3 (2 x 20 ml + 2 x 20 ml)	1 pc
980306	Pump tube / PVC/ 2 x Grey-Grey	1 pc
981342	Pump tube / ISMAPRENE / 2 x lilac - lilac	1 pc
984030	Washing solution (4 x 20 ml)	1 pc

984036	**6 MONTHS MAINTENANCE KIT FOR KONELAB 20 AND 20i**	
984072	Diluent and wash tubes	1 pc

984004	**6 MONTHS MAINTENANCE KIT FOR KONELAB 30 AND 30i**	
984023	Diluent and wash tubes	1 pc

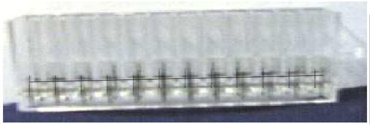
984007	**6 MONTHS MAINTENANCE KIT FOR KONELAB 60 AND 60i**	
984021	Diluent and wash tubes	1 pc

984028	**6 MONTHS ISE Complete tubing for Konelab 20i**	
984070	ISE Tubing kit for Kl20i	
984020	**6 MONTHS ISE Complete tubing for Konelab 30i and 60i**	
984037	**12 MONTHS MAINTENANCE KIT FOR KONELAB 20 AND 20i**	
984015	Syringe 500 µl grip fix	1 pc
984010	Dispensing needle (reagent & sample)	1 pc
984072	Diluent and wash tubes	1 pc
984071	Drain/waste tubes	1 pc
981481	Halogen lamp	1 pc
984008	**12 MONTHS MAINTENANCE KIT FOR KONELAB 30 AND 30i**	
981269	Syringe 500 µl	1 pc
984010	Dispensing needle (reagent & sample)	1 pc
984023	Diluent and wash tubes	1 pc
984022	Drain/waste tubes	1 pc
981481	Halogen lamp	1 pc
984012	Mixing paddle	1 pc
984005	**12 MONTHS MAINTENANCE KIT FOR KONELAB 60 AND 60i**	
981269	Syringe 500 µl	2 pcs
984010	Dispensing needle (reagent/sample)	2 pcs
984021	Diluent and wash tubes	1 pc
984022	Drain/waste tubes	1 pc
981481	Halogen lamp	1 pc
984012	Mixing paddle	2 pcs
984029	**12 MONTHS ISE MAINTENANCE KIT for Konelab 20i**	
984070	ISE Complete tubing kit	1 pc
984011	Dispensing needle ISE	1 pc
984006	**12 MONTHS ISE MAINTENACE KIT for Konelab 30i and 60i**	
984020	ISE Complete tubing	1 pc
984011	Dispensing needle ISE	1 pc
981269	Syringe 500 µl	1 pc
984076	**12 MONTHS KUSTI MAINTENANCE KIT**	
984073	Dispensing needle KUSTI	1 pc
984069	Tubing kit KUSTI	1 pc
981577	**INSTRUMENT ACCURACY TESTING KIT**	
	Accuracy Solution kit	1 pc
841214	Accuracy test procedure –description	1 pc

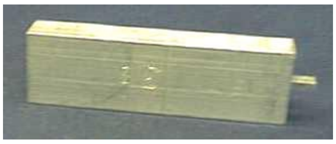
8.10 ADJUSTING TOOL SET FOR KONELAB

Ordering code 886655

- includes one piece of the following items:



Crosshair cuvette: **code 891792**
- for meas./sample/reag unit arm **mechanical** height adjustment



Metal cuvette: **code 830413**
- for cuvette arm incubator/cuv. loader mechanical adj.

Feeler gauge 0.1 / 0.2 mm: **code 886650**
between incub./cuv.loader backwall and cuvette

Cuvette loader mechanical adjusting tool:
code 841170 for Konelab 60/60i

Reflecting opto adjustment tool:
code 841270

8.11 Recommended parts of service-pack for all Konelab models

Including ISE and KUSTI models

-tubes, needles, paddles, syringes etc. not included. See accessories & consumables list.

PARTS

Cuvette arm K20/K30	840634
Cuvette arm K60	840076
DC motor CHOPPER	840460
Feedback sensor with holder	840020
Motor latch K60	840396
Motor mixer K30,K60	840367
Optical fiber 1200mm K20(K30Kusti)	841353
Peltier/thermistor set (reagent tray)K30/60	840629
Peltier/thermistor set (sample tray)K30/60	840705
Surface detector / diluent	888114

CABLES

Ground wire 500mm	840551
Ethernet/Can cable (workstation-konelab)	984045
Extension cable for motor 700mm	841154
Extension cable for motor 200mm	841411
Extension cable for opto 200mm	841408
Extension cable for opto 1500mm	840691
Heat. cable meas/disp.channel K20/30/60 (thermistor not included)	840335
Heat. cable inkub.K20/K30 (thermistor not included)	840866
Temp3-Foil resistor cable inkub disk K60 (thermistor not included)	840333
ISEAMP1-ISE3	840342
Mixer arm - motor3	840346
Opto reflective	840378
Opto dispense tilt	840338
Opto mixer	840348
Opto cable 620mm	840302
Opto wide cable 600mm	840417
Surf1-motor3/canbias (K20)	841394
Surf1-motor3 (K30/K60)	840344
Surf1-motor3/temp3(ISE)	840340
Thermistor 150mm	840847

BOARDS

Connection board 1-6	840961
Connection board 1-8	840956
CANBIAS	841342
INOUT3	840362
ISE3	840358
ISEAMP1	840357
MOTOR3	840364
PHOTO3	840356
PHOTO REF1	840354
PHOTO SIG1	840355
POWCAN 3	840361
SURF1A	840359
TEMP3	840363

ACCESSORIES

Lubrication oil silicon	752312
Silicon paste	585202
Lithium grease 200g	981614

Section 9 Installation Instructions

9.1 UNPACKING

Konelab and its accessories are shipped in three containers; one includes the analyser, the other PC and the third one table for the PC.

⇒ Check the package from the outside for possible damages during transportation. Contact your agent in case there are any damages.

Trained Konelab or Konelab's distributor personnel should unpack the analyser.

⇒ Check the contents of the package and the shipping list.

⇒ Check the equipment according to the reception reports.

For safe operation, after unpacking:

All electrical equipment is potentially dangerous. Never remove any component or cover from the analyser, unless directed to do so.

☞ Close the left panel (seen from the front of the analyser) in Konelab 60 with a screw so that the user cannot open it. The screw must be fastened from down under (see figure 9-1).

☞ Attach the metal plate with screws to the left side of Konelab 30 and 20 below the lamp house just inside the left side panel (seen from the front of the analyzer).

Due to the analyzer packaging, the side panel and the metal plate cannot be attached at the factory.

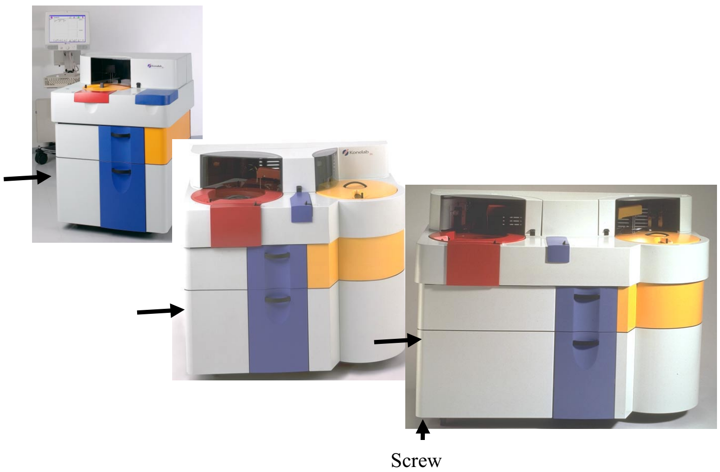


Figure 9-1: Close the left side of the analyzers for the electricity safe.

9.2 LOCATION

Always disconnect the line cord before removing the analyser panels. Voltage present in the analyser may produce a severe, perhaps even a fatal electrical shock.

The location of the instrument should satisfy the following criteria:

Dimensions and weight of the analyzer:

	Konelab 60	Konelab 30	Konelab 20
Width	150 cm	120 cm	80 cm
Depth	79 cm	79 cm	79 cm
Height	115 cm	115 cm	115 cm
Weight	250 kg	200 kg	150 kg

It is necessary to leave a space of 20 cm between the rear of the analyzer and the wall.

Only one power connection and connection to the workstation is needed. Any other connections, e.g. water, draining, air or gas pressure, are unnecessary. Refer to Figure 9-2.

This analyzer is designed to be grounded through the line cord for safe operation. To ensure continuous safety of the operation personnel the analyzer must be connected to an electrical outlet that has an effective ground connection. If you are in any doubt as to the safety of your electrical supply system, consult a qualified electrician.

Power requirements:

Konelab 60	Konelab 30	Konelab 20
100 - 240 V ± 10 % 50 - 60 Hz ± 5 % 1.2 kVA	100 - 230 V ± 10 % 50 - 60 Hz ± 5 % 0.7 kVA	100 - 240 V ± 10 % 50 - 60 Hz ± 5 % 0.4 kVA

Konelab 60 and 30 have power failure security (battery back-up facility).

Operating conditions:

- Ambient temperature 15-32 °C

- 40-85% humidity (non condensing)

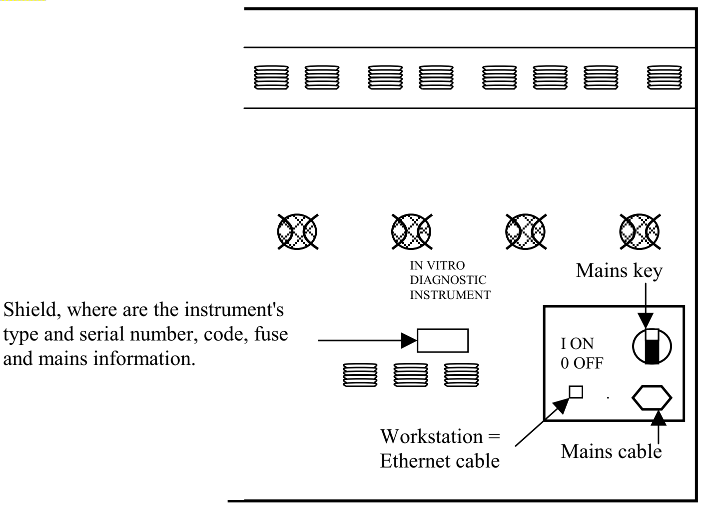


Figure 9-2: The rear of the instrument

9.3 SET UP

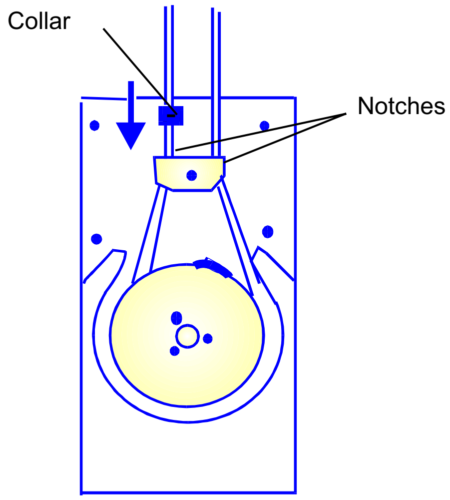
Before connecting the main power plug, do the following:

⇒ Visually inspect the instrument from the outside and inside for shipping damages.

⇒ Study user instructions carefully.

☞ Remove the cushions of foamed plastic placed under dispensers and mixers.

Install pump tubes in Konelab 60 and 30



- Attach the tube to fittings.

- Set the tube to the steering roller and rotate the pump clockwise. Let the rotation of the pump feed the tube, do not stretch it.

- Lift the collar into notches.

- Check that the tube is on every steering roller.

- Rotate the pump to check the water feed.

Figure 9-3: Installation of the pump tube

Install the cuvette waste compartment

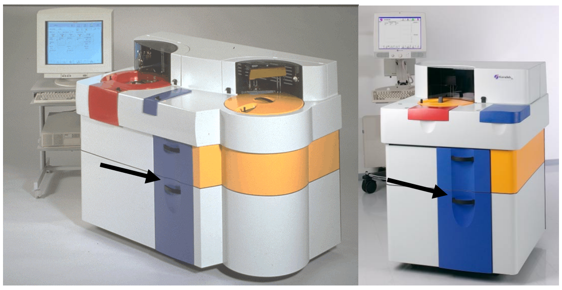


Figure 9-4: The cuvette waste compartment locates in the upper drawer of the analyzer stand.

☞ Ensure that there is a plastic bag in the cuvette waste compartment.

Install distilled water and wastewater containers

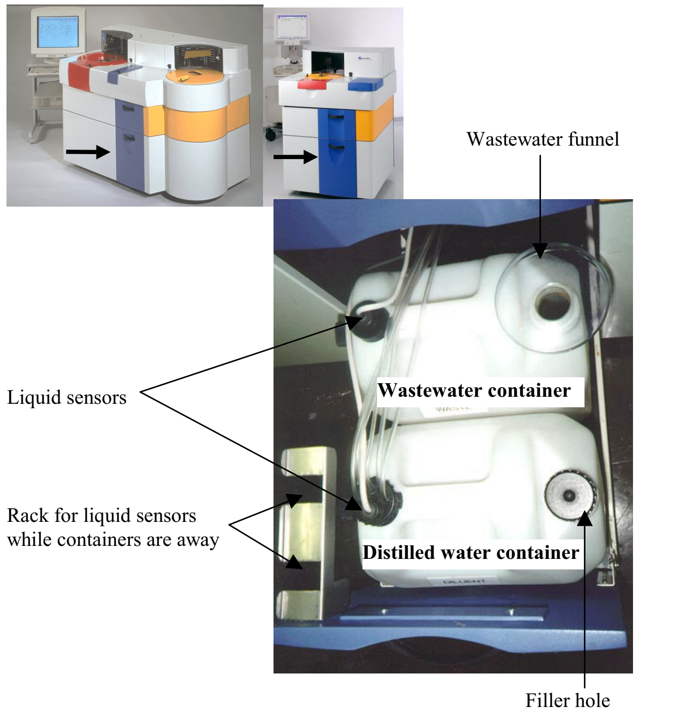


Figure 9-5: The distilled and the wastewater containers locate in the lower drawer of the stand.

☞ Insert the funnel to the wastewater container.

☞ Fill distilled water to the distilled water container and install liquid sensors. Purified water, water type 1 is preferred. See requirements under.

☞ Close the drawer slowly and simultaneously check that the funnel is pushing the drop collector to the side under the analyzer, above the drawer.

Requirements of Type I water:

>10 MΩcm, 0.2 µm filtering, <170 ppm TDS (=total dissolved solids), <10 cfu/ml

or

Resistivity:	5 – 15 MΩcm (15 MΩcm) setpoint	**TOC**	<50 ppb
Particle-free	>0.22 µm	**TDS**	<50 ppb
Silicates	<10 ppb	**Heavy metals**	<1 ppb
Microorganisms	< 10 cfu/ml		

Fill the cuvette loader

☞ Install one package of cuvettes.

Connect cables, switch mains on (Refer to Figure 9-2)

☞ Connect the Ethernet cable to the rear of the instrument.

☞ Connect the mains cable of the instrument to the power supply.

9.4 WORKSTATION

Minimum requirements for PC

Processor	350 MHz Intel Pentium II with 512Kb Cache
Chassis	Low Profile OptiFrame
Memory	128Mb ECC SDRAM (1*128Mb)
Video adapter	Integrated 4Mb ATI Rage Pro turbo 2 x AGP
Monitor	Dell UltraScan D1025-HE 17" (VIS 15.7") TCO95
Floppy drive	3.5" 1.44 Floppy drive
Keyboard	105-key Performance keyboard
Hard drive no. 1	4.3Gb ultra DMA EIDE Hard Drive
Hard drive no. 2	Not included
Soundcard	Integrated 16bit Sound card
Cd rom	CD Read/ Write IDE 4/2/24 Speed
Speakers	ACS90
Integr. Network adapter	Integrated 3Com Ethernet 10/100Mbit
Network adapter	Not Included
Backup solution	Not Included
Operating systems	Windows NT Workstation 4.0 English

Minimum requirements for printer

The acceptable type of printer depends on what printer drivers are found in Windows NT PC connected to Konelab. The connection should be a parallel port using the direct RS-232C interface.

9.4.1 PREPARING FOR USE A NEW DELL PC WITH WINDOWS NT

WARNING! When Konelab 20 is installed, DO NOT install Windows NT Service Pack. Service Pack corrupts RTX/RTSS Console application needed for Kl20.

Dell delivers PC's with a pre-installed Windows NT operating system. This section describes how to finish the Windows NT installation.

1) Unpack the PC and connect all cables according to the manufacture's guide.

2) Connect the PC to an AC outlet and turn on the power.

3) The PC starts automatically Software Setup. Software Licenses; press y.

4) Windows NT Setup (automatic).

5) Software License Agreement, click 'I Agree' with the mouse.

6) Windows NT Setup dialog:
- press next
- give name and organization (example: Konelab user & name of laboratory)
- press next
- registration: Product Id from Certification of Authenticity
- press next
- Administrator Account password : Klab1sUPER
- Confirm the password
- press next
- Network Installation
- press next

7) Long automatic software setup

8) Restart
- click RESTART icon with the mouse
- **BOOTING**

9) Ready to logon
- login as Administrator with password set up at step 6

10) Convert hard disk D file systems to NTFS
- Start -> Programs -> Administrative Tools -> Disk Administrator
- press OK
- press Y
- disk partitions appear on the screen
- if there are partition E: or more, these must be merge with partition D:
- delete D:, E: and bigger partitions and delete it (partition_delete "Yes")
- select "grey box" which indicates free area in the hard disk , select partition_commit_change_now "Yes"
- select "grey box" and Create_partition "Ok"
- select D:partition_commit_change_now "Yes"
- activate disk partition D by clicking it with mouse
- select Tools
- select Format
- from Format dialog select file system : NTFS
- check that partition D is really activated: the boundary of D is a black boarder
- press Start
- press OK
- Format complete
- press OK
- Select Tools
- Select Drive_letter
- Check that the Letter for CD_ROM is E:, change if not
- press Close
- exit application

11) Convert hard disk C file system to NTFS. It has two possibilities:

- First: Start -> Programs -> Dell Accessories -> Convert C to NTFS, press Y

- Second: Start -> Programs -> Command Prompt, Give command : convert c: /FS:NTFS, Press Y

- Reboot the workstation so that conversion of disk C can be done during Start up, select Start -> Shut down -> Restart the computer and press yes

- **BOOTING**

12) Workstation is ready for Konelab software configuration.

9.4.2 WORKSTATION CONFIGURATION

9.4.2.1 GENERAL

Following set up should be used at user's site:

- Workstation TCP/IP configuration: domain name is Konelab and IP address 193.94.136.60
- User name is Konelab and password Konelab
- Internal PC's IP address is 193.94.136.70

9.4.2.2 INSTALLING NETWORK

- Login as Administrator
- Select Start -> Settings -> Control Panel
- Select Network:
  - select Protocols-card
    - select Add
      - choose from list TCP/IP Protocol, press OK
      - TCP/IP setup: answer NO to DHPC
      - directory path is C:\I386
      - press Continue
  - DO NOT select OK or Apply
  - select Bindings-card
  - select Protocols card
    - select TCP
      - select Properties
      - set IP address : 193.94.136.60, sub-net mask 255.255.255.0
      - select DNS card and set host name: Konelab
      - select Wins-card and disable LMHOST Lookup
      - press Apply
      - press OK
  - set up complains "At least one of the adapter cards has an empty primary WINS address. Do you want to continue?" Answer Yes every time this question is asked.
  - select Bindings card
  - select Identification card
    - select change
    - set the name Konelab
    - press OK
    - press OK
  - select Bindings card
- Close Network
- Restart ? answer Yes
- **BOOTING**
- Login as Administrator

9.4.2.3 SET REGIONAL SETTINGS

- Select Start -> Settings -> Control Panel
  - Select regional settings
    - Select correct region
    - Select Set as system default locale
    - Press Apply
    - Do you want to restart, answer No
    - Select Input locales
    - Select correct region
    - Press Set as default
    - Press Apply
    - Press OK

9.4.2.4 SET UP DISPLAY

- Select Start -> Settings -> Control Panel
  - Select display
    - Select settings card
      - Press List all modes
      - Select from list: 1024 by 768 pixels, True Color, with highest Hertz value available (probably 85 Hertz)
      - Press OK
      - Press Apply

9.4.2.5 ADJUST DISPLAY

☞ Connect the monitor, keyboard, mouse, printer and the workstation and connect the mains to the power supply.

☞ Adjust the display of the monitor: Adjustments are done with the arrow buttons locating beside the power button of monitor.

Press Δ or∇ button to see the menu. With the same buttons you can move in the menu list. Open the selected submenu, e.g. width, with $\triangleright$ button. Adjust the selected property with Δ or∇ buttons: Δ button increases and ∇ decreases the property. After adjusting, the new setting will be stored automatically. Menu disappears automatically in a few seconds. For further information, see the Monitor User's Guide booklet and/or CD.

9.4.2.6 SET UP PRINTER

Set up printer LX-30

- Select Start: Settings: Printers
- Select Add printer

  My computer <next>
  LPT1 <next>
  Epson LX-300 <next> <next>
  Not shared <next>
  If You do not have PC installation CD in your hand , drivers can be found from C:\i386 - folder
  Test page Yes/No
- Select Start: Settings: Printers if not selected

  Select LX-300 and click with the right mouse button so a pop up menu appears
  Select Document default
  Paper size: Fan fold 8.5 x 12 in.
  Paper source: tractor feed
  Press OK
  Select LX-300 and click with the right mouse button so a pop up menu appears
  Select Properties
  Select Device settings
  Change Tractor feed setting -> Fan fold 8.5 x 12 in
  Press OK

Set up printer FX-80

Same printer can be defined as FX-80. The quality of printing is poorer but the speed of printing is faster than using settings for LX-300.

- Select Start -> Settings -> Printers if not selected

  Select Add printer
  My computer <next>
  LPT1 <next>
  Epson FX-80 <next> <next>
  Not shared <next>
  If You do not have PC installation CD in your hand , drivers can be found from C:\i386 - folder
  Test page Yes/No
- Select Start -> Settings -> Printers if not selected

  Select FX-80 and click with right mouse button so a pop up menu appears
  Select Document default
  Paper size: Fan fold 8.5 x 12 in.
  Paper source: tractor feed
  Press OK
  Select FX-80 and click with right mouse button so a pop up menu appears
  Select Properties
  Select Device settings
  Change Tractor feed setting: Fan fold 8.5 x 12 in
  Press OK

Set up default printer

- Select Start -> Settings -> Printers if not selected
    Select FX-80 and click with right mouse button so a pop up menu appears
        check that Set As Default is marked with v if not click Set As Default

9.4.2.7 CHECKING AVAILABLE DISPLAY MEMORY

- Select Start -> Programs-> Administrative Tools -> Windows NT Diagnostics
    Select Display card
        Properties of adapter and display will be seen.

9.5 KONELAB SOFTWARE INSTALLATION

Workstation is now ready for Konelab software installation

User must be Administrator when installing Konelab software, as it is if previous instructions have been followed. Otherwise login as an administrator

9.5.1 INSTALLING KONELAB AND OBJECTIVITY/DB

- Install Konelab CD into CD-drive
- Wait while the drive checks the new CD
- Installing starts automatically
    If it for some reason does not start automatically, user can select "setup.exe" from the Konelab-folder in the CD
- If Objectivity has not been, Installing of Objectivity/DB begins
    Press 'Install' and 'Next' selecting Objectivity/DB installing
    Change "Destination directory": press 'Browse', write **c:\objy** press 'OK'
    Installation asks, "Do you want directory to be created? " press 'Yes'.
    Press 'Next'.
    Press 'Next'.
    Press 'Next'
    Installation asks "Do you want to Setup to create a lock server system directory c:\usr\spool\objy?" Press **'Yes'**.
    DON'T reboot the PC yet; choose "No, I will restart my computer later".
    Press 'OK'.
    Press 'Exit'.
    Close the Objectivity Program Group window
- If C:\Konelab-folder does not exist, install goes without questions.
- If C:\Konelab-folder exists select "Reinstall Konelab".
- Press "Next"
- Choose "No, I will restart my computer later". Press 'OK'.
- Remove CD from CD-drive

9.5.2 CREATE USER KONELAB

- Select Start -> Programs-> Administrative Tools -> User Manager
  - Select Administrator by clicking the name with the mouse
    - Select option “never expires” for password and make it the only active selection
    - Press OK
  - Create New user
    - Select User-> New User
    - Username: Konelab
    - Full name: Konelab User
    - Password; Konelab
    - Confirm password: Konelab
    - Select option “Password never expires” for password and make it the only active selection (remove option ‘User must change password at next logon’)
    - Select OK
- Exit the application.

9.5.3 SETTING KONELAB APPLICATION

Needed only if language will be changed
- Exit from Konelab
  “F8 More” => “F3 Management” => “F8 More” => “F3 EXIT”
- Select Start -> Programs ->Konelab language selection
  Language selection can be done as Konelab-user
- Select language if needed (default English)

9.5.4 LOGIN AS USER KONELAB

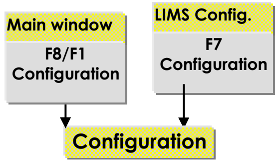
- **Restart** the PC
- **BOOTING**
- Login as User: Konelab password: Konelab; the Konelab Application should start automatically

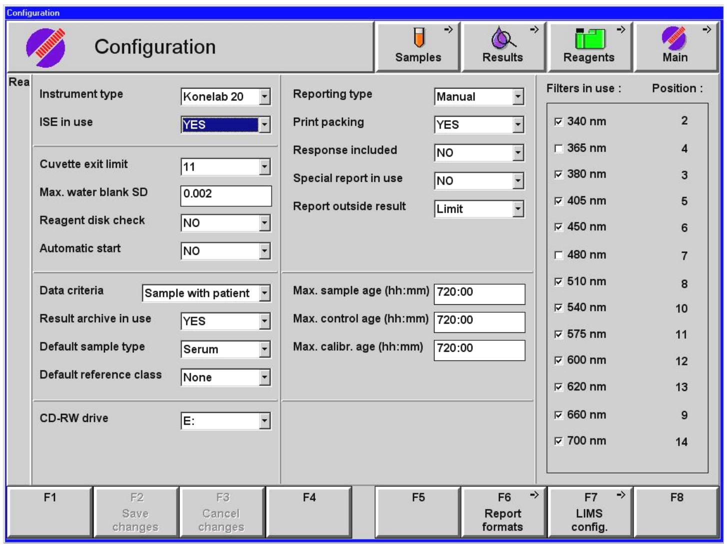
9.5.5 SET REGIONAL SETTINGS

Checking of regional settings can be done now
Exit from Konelab
  “F8 More” => “F3 Management” => “F8 More” => “F3 EXIT”

Select Start -> Settings -> Control Panel
- Select regional settings
  - Select correct region
  - Press Apply
  - Select Input Locales - card
  - Select correct region
  - Press Set as default
  - Press Apply
  - Press OK

9.6 Konelab CONFIGURATION



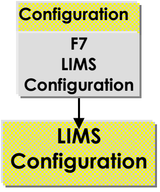


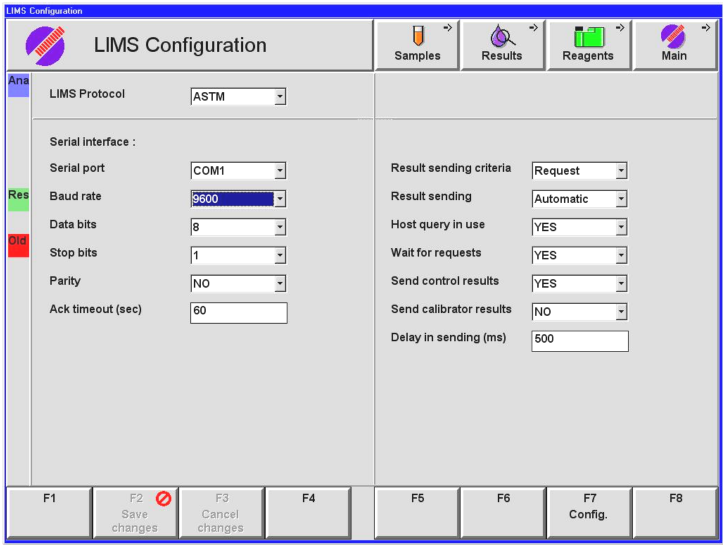
Information seen in the CONFIGURATION window:

- *Instrument type*	The instrument type, Konelab 60/ 30/ 20, is seen.
- *ISE in use*	Connect ISE unit on or off. Changing demands rebooting.
- *Cuvette exit limit*	The maximum number of unused cuvette cells before the cuvette is allowed to discard.
- *Max. water blank SD*	The maximum allowed limit for water blank standard deviation.
- *Reagent disk check*	Select if the reagent disk is checked or not (YES / NO) when the analyser is booted. The reagent data is read and the volume checked when Yes is answered.
- *Automatic start*	Connect automatic start on (yes) or off (No).
- *Data criteria*	Select if the data is entered and automatically reported according to patients or according to samples. Samples can be selected with or without patient. Without patient means that the patient name is neither seen in the Sample entry window nor in reports.
- *Result archive in use*	Select if the result archive is used or not. If archive is taken out of use the data of it is lost. When archive is taken into use it is recreated automatically.

- Default sample type	Select the default sample type used in Sample/ Patient entry.
- Default reference class	Select the default reference class used in Sample/ Patient entry.
- CD-RW drive	Select the drive, which writing CD is using.
- Reporting type	Select if reporting is manual or automatic.
- Print packing	Select if the report's results are packed or not (YES/ NO). If Yes is selected the report includes more than one patient's/ sample's/test's results in one page. If No is selected one report page includes only one patient's/ sample's/ test's results.
- Response included	Select if the response is included in reports or not.
- Special report in use	Select if you use the special, configured report (Yes) or the default one (No).
- Report outside result	Select if the outside result is reported as a limit symbol, e.g. <Low limit or as a exact value.
- Max sample age	Type the maximum allowed sample age in hours and minutes (hh:mm). The sample is marked ‘Old’ and is not dispensed if the time is over. Maximum allowed time can be 720 hours (1 month) and at least it must be 1 minute. Sample age concerns all samples in the segments, STAT positions and coming through automated sample line.
- Max control age	Type the maximum allowed control age in hours and minutes (hh:mm). The control sample is marked ‘Old’ and is not dispensed if the time is over. Maximum allowed time can be 720 hours (1 month) and at least it must be 1 minute. Sample age concerns all controls in the segments, STAT positions and coming through automated sample line. The age of controls, which are in the fixed positions in the sample disk, cannot be followed
- Max calibrator age	Type the maximum allowed calibrator age in hours and minutes (hh:mm). The calibrator sample is marked ‘Old’ and is not dispensed if the time is over. Maximum allowed time can be 720 hours (1 month) and at least it must be 1 minute. Sample age concerns all calibrators in the segments, STAT positions and coming through automated sample line. The age of calibrators, which are in the fixed positions in the sample disk, cannot be followed
- Filters in use, Position	Mark the installed wavelengths, beside you can see the position in the filter wheel.

9.6.1 LIMS configuration





- *LIMS Protocol*	The used laboratory information management protocol in online connection.
- *Result sending criteria*	Select the result sending criteria, Sample / Request, in the LIMS protocol.

If the LIMS protocol is KONE Online, the following field is also seen:

- *New/ Old check in use*	Select if the sample's new/ old check is used (Yes) or not (No) during the LIMS protocol.

If the LIMS protocol is ASTM, the following fields are also seen:

- *Result sending*	Select if the results are sent to the host computer automatically or when requested.
- *Host query in use*	Select if the host query is used or not during sample/patient entry.
- *Wait for requests*	If Host query was selected in use then the user can select if requests are waited for or not during sample/patient entry. If 'Yes' the user is waiting for after entering the name of a new sample/patient. Otherwise the user is working and requests are coming parallel.
- *Send control results*	Select if control results are sent to the host computer or not.

- *Send calibrator results*	Select if calibrator results are sent to the host computer or not.
- *Delay in sending (ms)*	The delay needed before Konelab sends e.g. sample data to the host computer. The default value is 200 milliseconds, minimum is 0 and maximum 30 seconds.

Serial Interface parameters:

- *Serial port*	Select the serial port from the pull down menu. Alternatives are from COM1 to COM4.
- *Baud rate*	Select the baud rate values between 110 and 9600.
- *Data bits*	The number of data bits can be 7 or 8.
- *Stop bits*	The number of stop bits can be 1 or 2.
- *Parity*	Select the parity checking. It can be even or odd. If checking is not wanted select NO.
- *Ack timeout (sec)*	The maximum time the response is waited for.

9.7 ISE Set Up

9.7.1 MATERIAL

Konelab Maintenance-free, micro volume electrodes are ready-to-use. The reference electrode contains filling solution bag, which has to be attached to the side port of the electrode before use.

They are coded with colour spots. The used colours are following:

Na - yellow	**K - red**	**Ca - green**
Cl - blue	**pH - white**	**Li - grey**
Ref – brown		

For sample detection:

End slice - in:	**Grounding wire - black**
End slice - out:	**Impedance - transparent**

The electrode block is built up of 3 (K^+, Na^+ and Cl^-) or alternatively 6 (optional Ca^{2+}, Li^+, pH; in Konelab 20 only Li^+ is optional) micro volume ion-selective electrodes, one reference electrode and two additional end slices for grounding and sample detection. The electrodes, as well as the end slices, are connected together using small positioning dowel pins.

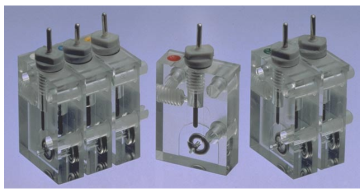


Figure 9-6: Maintenance-free electrode block with 6 ion-selective electrodes

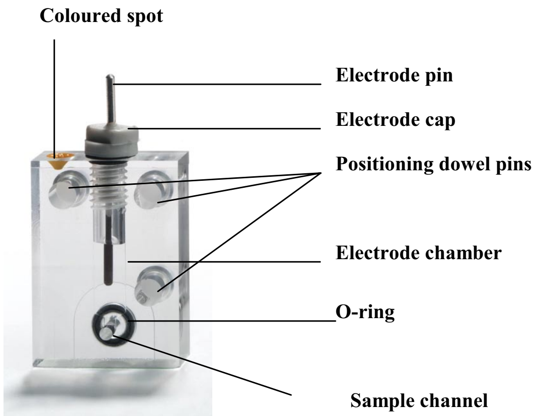


Figure 9-7: A single electrode

9.7.2 INSTALLATION

MAINTENANCE FREE ELECTRODE

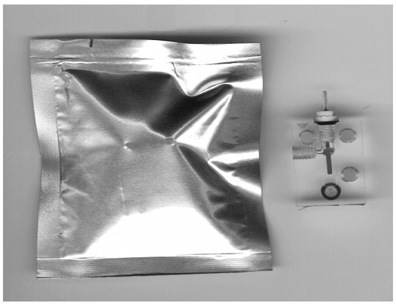


Figure 9-8: Foil bag containing an electrode and the electrode

☞ Remove the foil bag from the electrode box and tear it at the small cut to open.

☞ Check that the inner filling solution is covering the membrane.

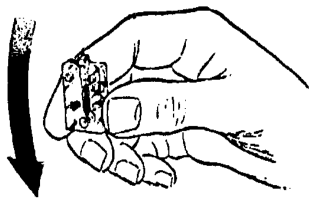


Figure 9-9: Holding the electrode upright, gently force out any trapped air from the membrane surface with a flick of the wrist. Do not tap the electrode on a hard surface!

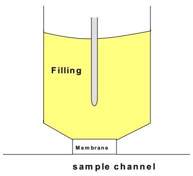


Figure 9-10: An electrode chamber when the electrode is ready for installation into the instrument

The electrode is now ready to be installed.

REFERENCE ELECTRODE

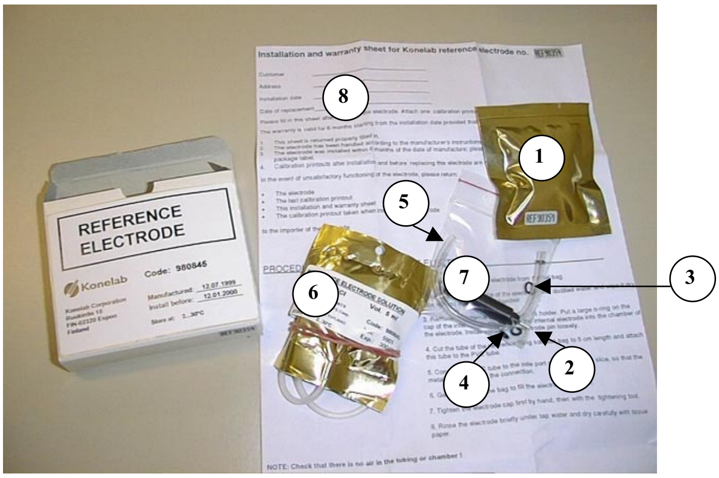


Figure 9-11a: The Reference electrode kit

1. (1) ref. electrode slice in foil bag
2. (1) internal electrode
3. (1) large o-ring for internal electrode
4. (2) small o-rings, 1 as spare
5. (1) PVC tube for filling solution bag attachment
6. (1) electrode chamber filling solution bag
7. (1) tool for tightening the electrode cap
8. Warranty sheet

Check that there is no air in the tubing or chamber.

☞ Remove the reference electrode from the foil bag and rinse the outer surfaces with distilled water. Flick excess liquid out of the chambers and wipe the outer surfaces dry.

☞ Place one large o-ring on the electrode cap, install it loosely into the chamber; refer to Figure 9-11b.

☞ Connect a PVC tube to the side port of the slice so that the metal spring fastens the connection; refer to Figure 9-11b.

☞ Cut the tube of the Filling Solution bag to 5 -7 cm length and attach the PVC tube to open end. Avoid letting air back up into the tubing. Gently squeeze the bag to fill the chamber. Tighten the electrode cap first with fingers then with the tool.

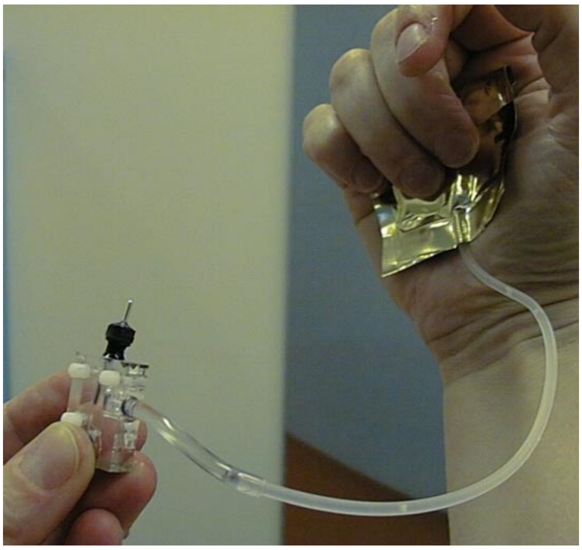


Figure 9-11b: Filling the reference electrode

ASSEMBLING THE ELECTRODES

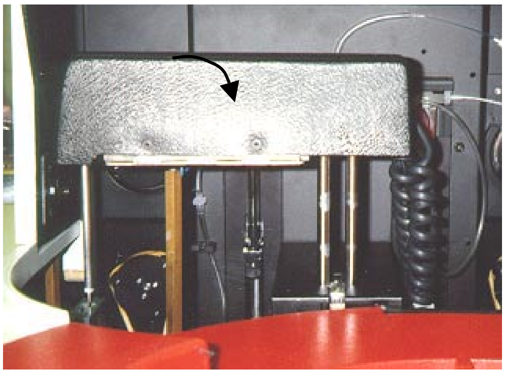


Figure 9-12: The ISE dispensing arm

☞ Turn the cover of the ISE dispensing arm so that you can see the position of the block. The cover is hinged, so it is easy to open.

There must always be an o-ring between two electrodes.

☞ Place electrodes according to the label in the place of the block. Viewed from the front of the block when the ISE needle is to the left, the order of the electrodes is from left to right: end slice with the transparent code, Cl, Ref., K, Na, Li, Ca, pH and end slice with the black code.
Place an o-ring on the left side of the end slice with the black code. Ensure that there is an o-ring between two electrodes before you press the electrodes so that the positioning dowel pins are aligned. Note that the tube of the reference electrode must be towards you.

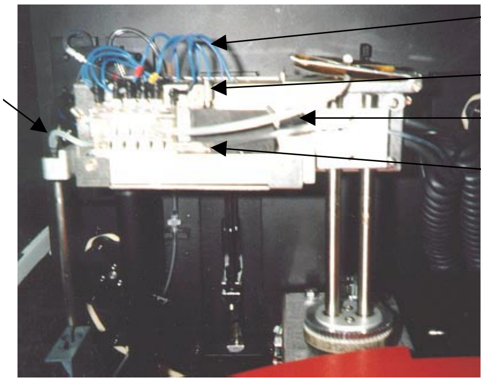


Figure 9-13: The electrode block in the ISE dispensing arm

The block must include the Na electrode when Li is measured and the block must include pH when Ca is measured.

☞ Place the electrode block between end slices. Turn the lever so that the block is firmly in its place. Note that there is a screw with which you can adjust the length of the block.
Attach the filling solution bag of the reference electrode to its place: Place the hole of the bag to the hook and turn the bag under the metal plate.

When removing an electrode block from the instrument, detach it from end slices and leave them intact.

☞ Connect signal, detecting and grounding wires to the pins at the top of the block ensuring that the cap colour corresponds to that of the slice.

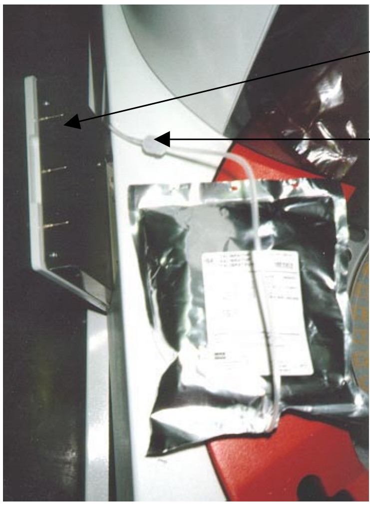
☞ Ensure that the tubes are connected: from the left side of the block to the needle and from the right side of the block to the connector of the tube, which leads to the syringe/ to the FMI pump in the Konelab 20.

☞ Turn the cover of the ISE dispensing arm back. Check that it is not pressing the tubes.

Define which electrodes are in the block

Open the ISE Electrodes window and select, which electrodes are in the block. The ISE test has to be defined in the Test definition window.

Install ISE Calibrator 1



The place for the bag

Luer lock to connect ISE Calibrator 1 to the tube coming from the ISE dispensing pump

Figure 9-14: ISE Calibrator 1 is in a foil bag, which minimizes evaporation.

☞ Connect the tube of ISE Calibrator solution 1 to the tube coming from the ISE dispensing pump. Connection is made turning the Luer lock to the counterpart.

☞ Hang the bag on the hooks in the gate placed on the left side of the instrument. In case the instrument has the KUSTI module, the gate is in front of the instrument.

☞ After changing the bag, ask calibration in the Calibration/ QC selection window. After that the ISE calibrator 1 can be fetched by Reagents, F4 Add ISE CAL1.

Give ISE requests, check calibration

Never use distilled water as a sample with ISE electrodes.

Once ISE Calibrator solutions are in place (to define the positions of Calibrator solutions 2 and 3 go to the Cal/Ctrl definition window) and Start up has been done, give some ISE requests and enter sera as sample. Inspect the detailed calibration results for all electrodes in the Calibration results window.

If problems occur, check the connections of electrodes and Calibrator 1. Recalibrate in the Calibration/ QC selection window.

When calibration is successful, a pre run of 10 sera should be analysed with subsequent new calibration before analysing patient samples.

Complete the Warranty and Installation Sheets

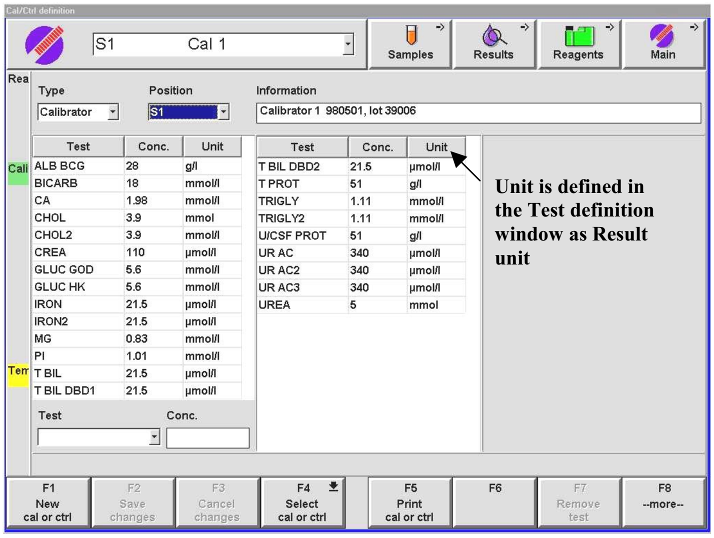
Complete the Warranty and Installation Sheets (in the Electrode Kit, one for each electrode). Separate the sheets from each other.

9.8 HOW TO TAILOR TESTS

For each test customer is using check the following:

1) CAL/ CTRL DEFINITION

Use a point, not a comma as a decimal separator, e.g. 5.6 is right, not 5,6.

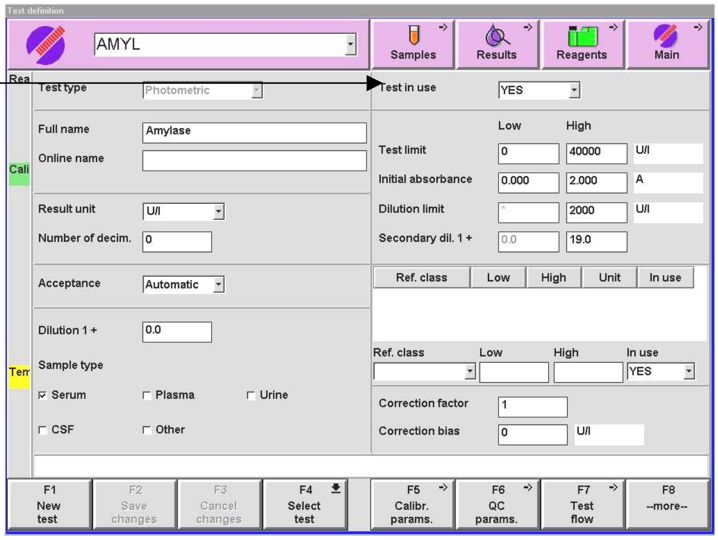


Check values and names of calibrators.

Define names of QC samples.

2) TEST DEFINITION

Make sure that the test is selected: Test in use - Yes.



Check and correct:

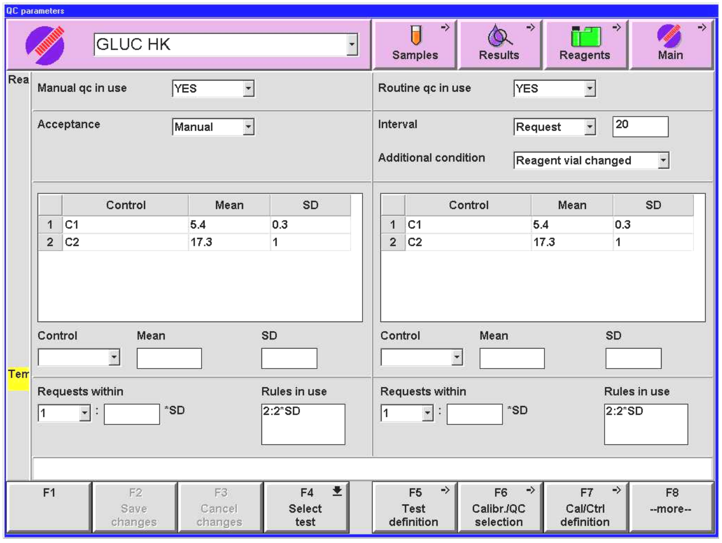
- Result unit.
- Number of decimals.

In case the result unit has been changed, check and correct also:

- Test limit values.
- Dilution limit values.
- Nonlinearity limit value in concentration unit.
- Limit values for antigen excess check sample.

Reference classes should be defined according to the method and usual reference ranges used in the laboratory.

3) QC PARAMETERS



Select Manual qc in use - Yes.

Select Routine QC in use - Yes.

Define Interval as requests or time like 2:00 (2 hours).

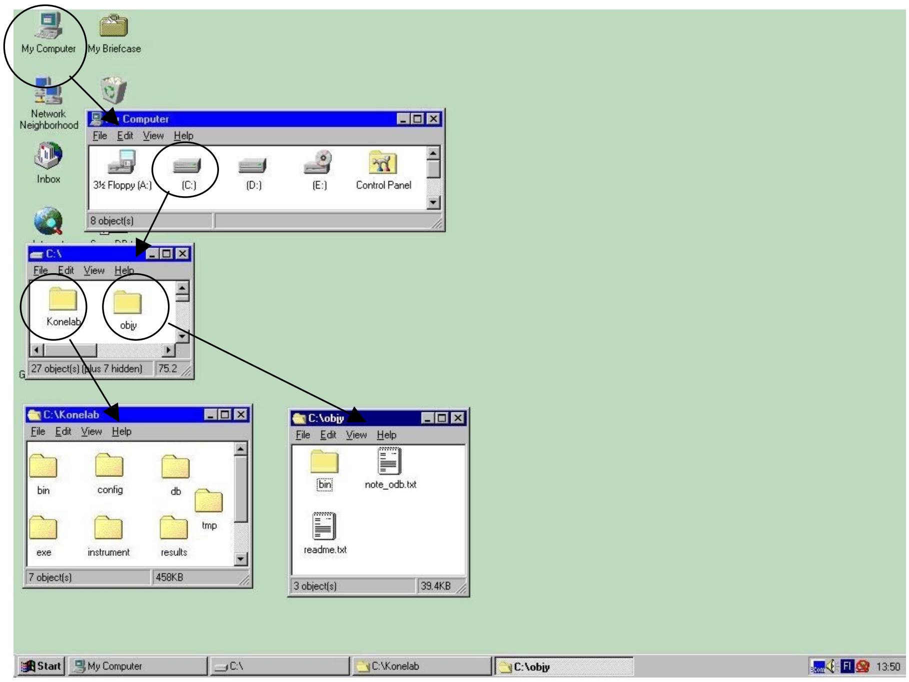
Introduce for both quality control types:

- Control name,
- Mean value,
- SD,
- Rules.

Section 10 Workstation Software

Konelab software is in a CD-ROM which is self-starting. In case you have problems take away the CD-ROM from the CD-ROM drive and put it back. If it doesn't help the Konelab software can be opened by the program konelab\setup.exe. Instructions to install the Konelab programs are found from the folder Wrd6 in the CD-ROM. Instructions are in the files klabinst.doc and klwsconf.doc.

10.1 Konelab FOLDERS



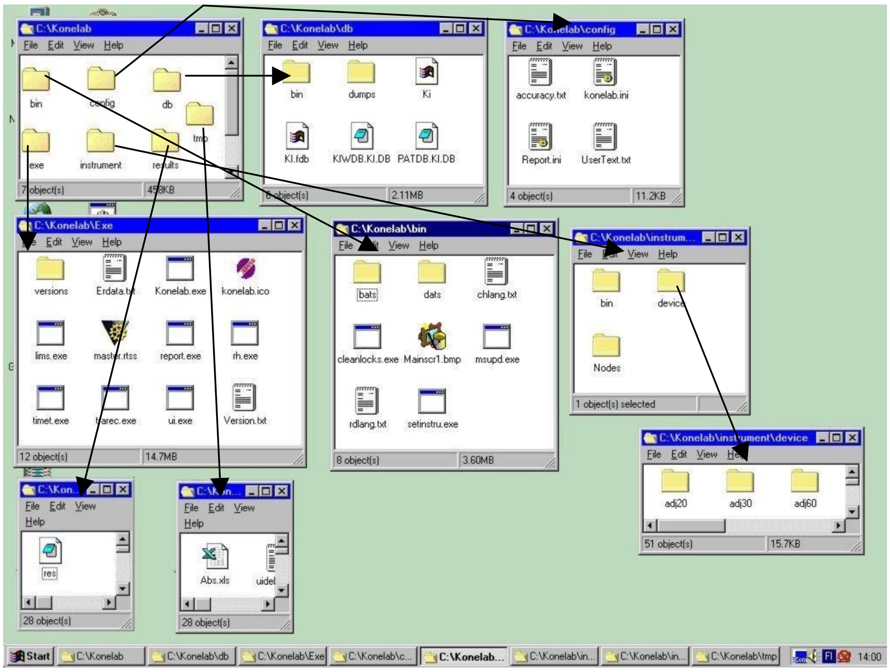
☞ To see the folders of Konelab double-click the icon My Computer. Then double-click the drive C icon.

Folders c:\Konelab and c:\objy belong to the Konelab program. The program doesn't work without them.

There can be also e.g. a folder c:\konelab\1.5.4.\exe. It contains the files of old Konelab program version. You can keep the older program version for troubleshooting purposes.

☞ Double-click the folder icons Konelab and objy to see the contents of the folders.

10.1.1 CONTENTS OF THE C:\Konelab -FOLDER



The Konelab folder consists of folders db, exe, config, tmp, bin, instrument and results.

C:\Konelab\db -folder

The folder db includes the database of user. The folder must include the files: Ki, Ki.fdb and KIWDB.KI.DB. Furthermore there are folders to save and manage the database.

C:\Konelab\exe -folder

The folder includes Konelab exe programs and files version.txt and erdata.txt. The user is not allowed to delete or change any file of the folder.

C:\Konelab\config -folder

The folder includes files konelab.ini, usertext.txt and report.ini. The only approved way to change the file konelab.ini is to do it in the Configuration window in the Konelab program. The file usertext.txt consists headers of reports which the user can edit. User texts are edited in the Report formats window in the section General header. Refer to section 3.11in Reference manual. The file report.ini includes the report formats which the user has edited in the Report formats window.

C:\Konelab\tmp -folder

The folder includes files which are produced during the use of Konelab program. Files are meant for service.

C:\Konelab\bin -folder

The folder includes files for program management, language changing etc. The user is not allowed to delete or change any file of the folder.

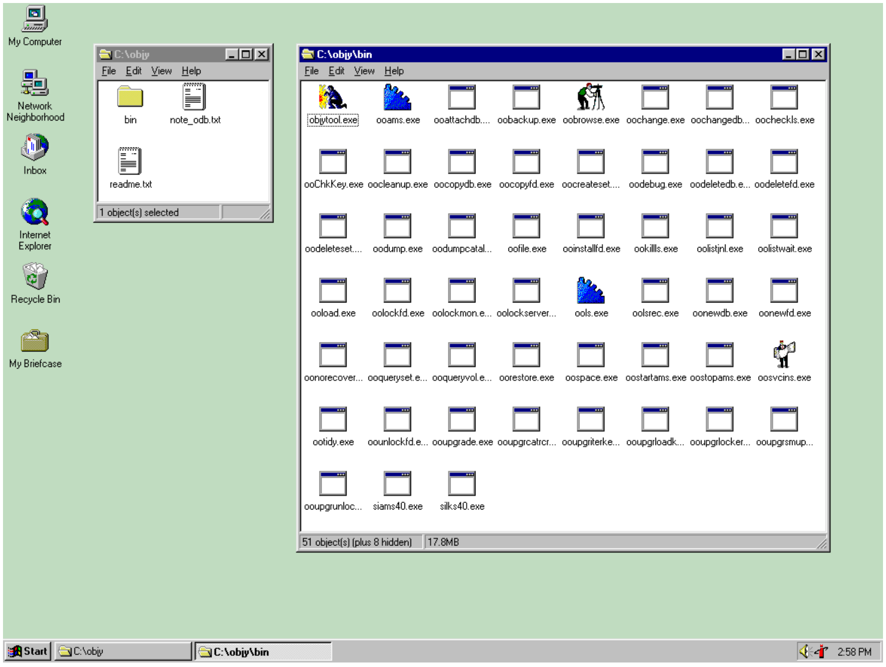
C:\Konelab\instrument -folder

The folder includes folders for instrument management, e.g. adjustment values. The user is not allowed to delete or change any file of the folder.

C:\Konelab\results -folder

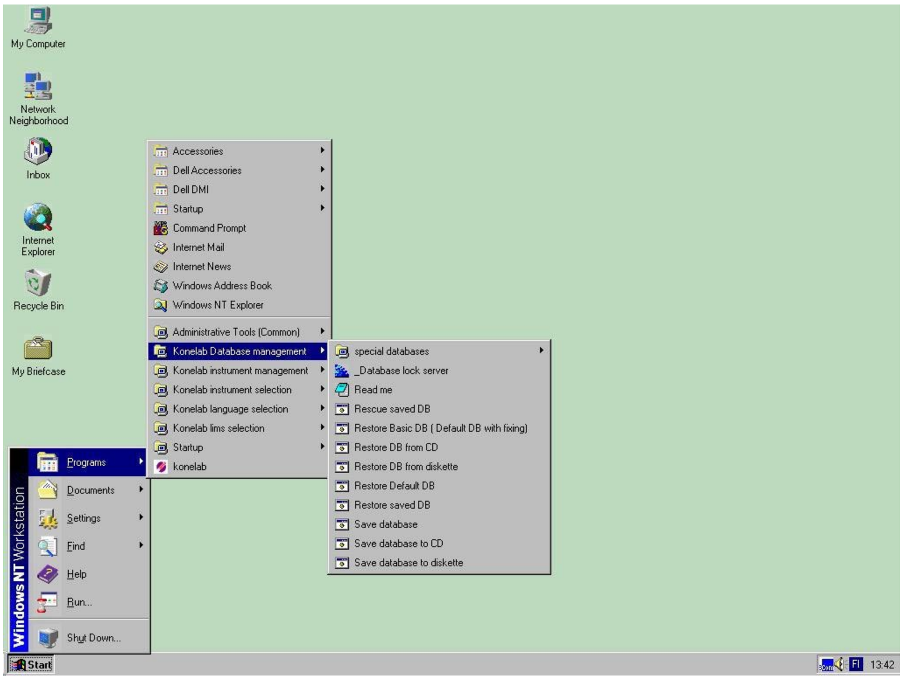
The folder includes result files that are produced when the function Print to file is used in the Reports window. Refer to section 3.5 in Reference Manual.

10.1.2 CONTENTS OF THE C:\bin -FOLDER



The bin folder includes files which are needed to manage the database. The user is not allowed to delete the files.

10.2 Konelab MENUS



To see Konelab program menus click the Start button in the left corner of the window and select Programs from the list.

konelab

To start Konelab program, click the konelab icon. Wait until the User interface is up. Do not start the program if it is running already. Note that when Konelab 20 program is started RTX/RTSS Console application window is seen, DO NOT close it.

10.2.1 Konelab Database management

The menu includes functions to manage the database, it includes different commands for taking a backup of the database and restoring it. **Before any restore the user must EXIT from the Konelab program in the Management window.** The database can be confused if restore is made when the Konelab program is running.

Saving can be done here or in the Management window in the Konelab program. Saving/ restoring means that both routine database and patient archive are saved either to hard disk or to CD (refer to section 10.2.1.1). Only routine database can be saved to/restored from a diskette. It is recommended to clear the daily files before saving the routine database to a disk. Otherwise saving can be very slow and demand space too much. For the Management window refer to section 3.6 in Reference manual.

The detailed instructions of functions in the Konelab Database management menu are in the 'read me' file.

Save database
Takes a backup of the current database and patient archive on hard disk.

Save database to CD
Takes a backup of the current database and patient archive on CD.

Save database to diskette
Takes a backup of the current database to a diskette in drive a:. This overwrites the previous database in diskette if there is one.

Restore saved database
Restores the latest database backup taken with "Save database" if there is one.

Restore database from CD
Restores the database backup from a CD.

Restore database from diskette
Restores the database backup from a diskette in drive a:. Creates automatically a new patient archive. Note that it deletes the old one.

Restore default database
Restores the default database with Konelab parameters. Re-creates patient archive.

Restore Basic database
Restores the basic database system and the default database. Re-creates patient archive. This should be used only, if other restore functions do not work.
Use "Restore saved database" after this to restore the latest backup.

Rescue saved database
Restores the automatic database and patient archive backup taken after last "Clear daily files".

Re-create patient archive
Re-creates patient archive. Note that it deletes the old one, also results. In the Configuration window patient archive is re-created automatically when it has been out of use and it is taken into use again.

10.2.1.1 Saving the Konelab database to CD

We recommend to use one CD for one backup.

If you use re-writable (CD-RW) discs, note that the new backup files replaces the old ones.

If you use write-once (CD-R) discs, once the disc is full, you can only restore backups from it.

How to make database backup using CD-RW drive

NOTE! You must format CD-R(W) discs before you can use them. You can start the formatting by inserting a new, unformatted disc into CD-RW drive. The formatting has to be done only once for each disc.

☞ Insert a disc into CD-RW drive.

Format the disc, if necessary.

1) The DirectCD wizard should appear automatically. If not, start DirectCD manually: Double-click the CD-icon in the right corner of the display beside the time.
2) The wizard will guide you. Select DirectCD format.
   – Next
   – Next
   – Finish, CD is formatted
   – Ok.

☞ Select F6 Save DB to CD in the Management window or Save database to CD in the Konelab Database management menu to make a backup.

If problems occur check in the Configuration window that the drive of the CD is right.

☞ Eject the disc. When prompted for, select option “Leave the disc as it is…”.

☞ Store the disc in a safe place.

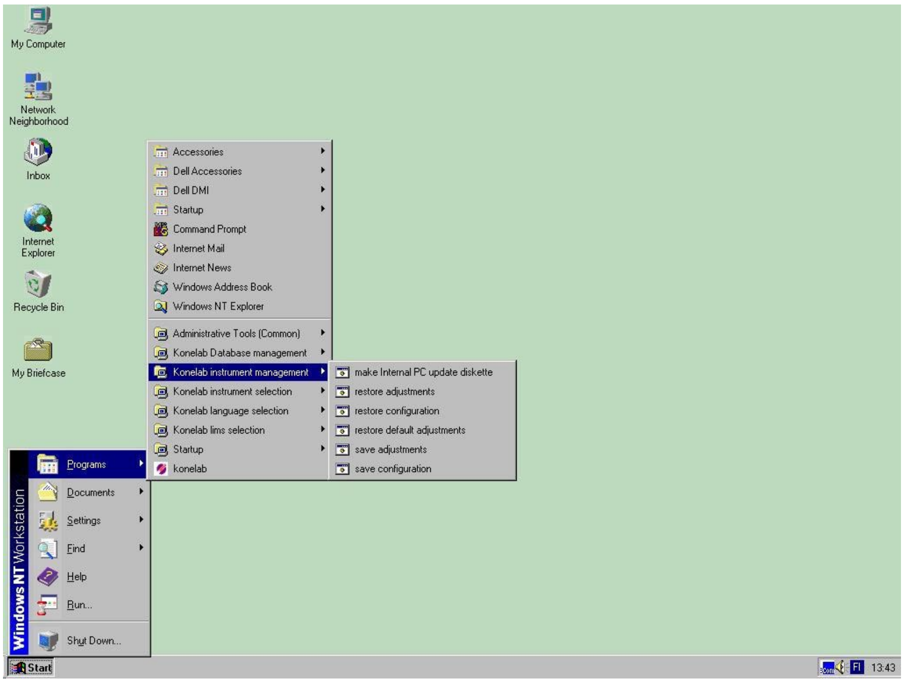
How to restore the backup from CD

NOTE! Databases are named like Save4020.db where first two numbers (40) express the software version and two last ones (20) instrument type.

☞ Insert a backup disc into CD drive.

☞ Select Restore DB from CD from the Konelab Database management menu.

10.2.2 Konelab instrument management

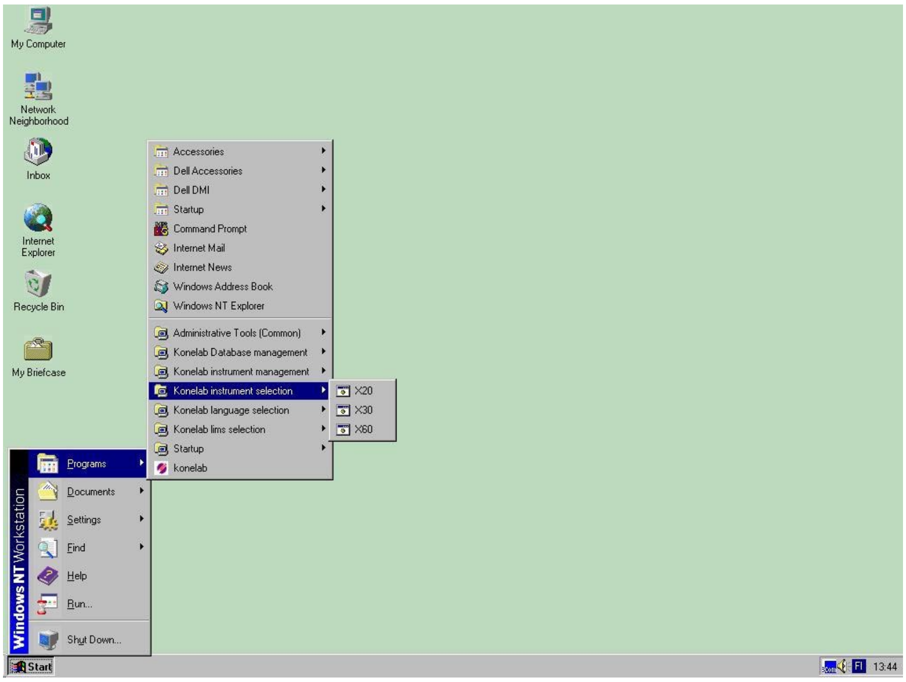


Konelab instrument management menu includes saving and restoring possibilities for configuration. It includes configuration values, user format report and headers of reports which the user has edited.

Saving and restoring possibilities for adjustment values concerns only Konelab 20. Default adjustments can be restored in case of problem situation.

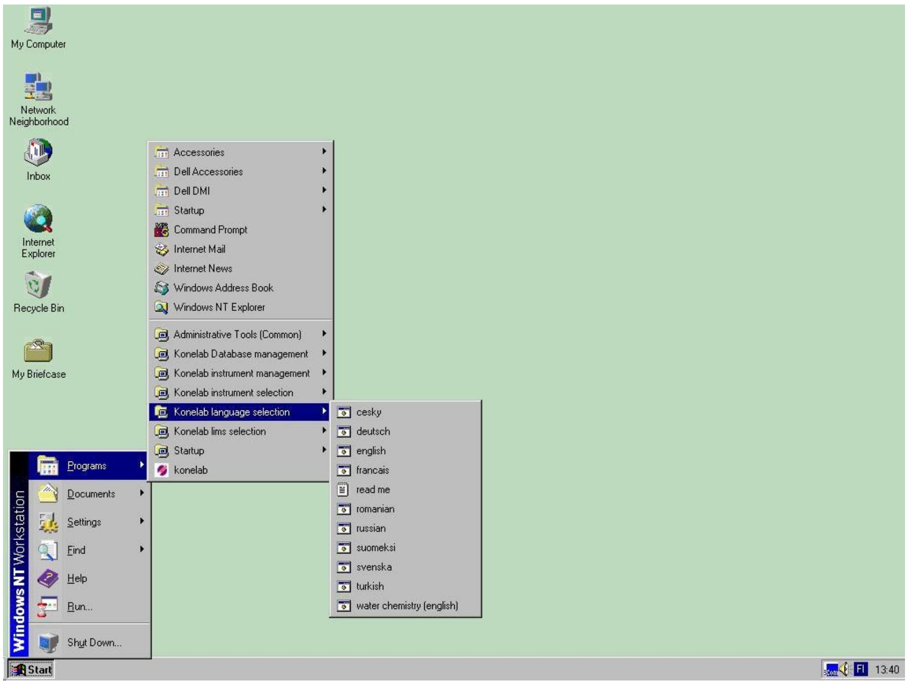
Update diskette for the internal PC for Konelab 60 and 30 can be made here. Put an empty diskette to a disk drive and give a command. The up to date data is loaded. A spare diskette is good to keep for troubleshooting purposes.

10.2.3 Konelab instrument selection



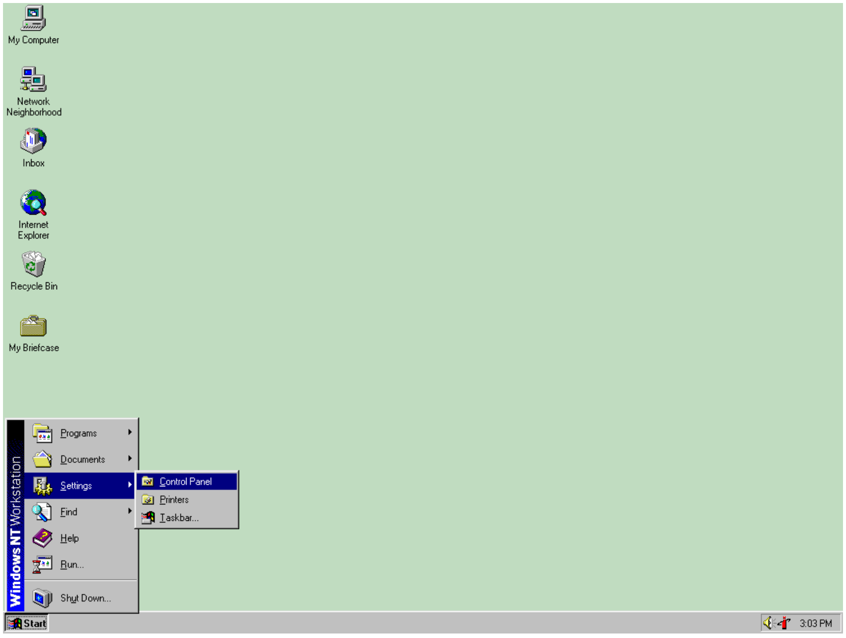
☞ In case of some instrument type mismatch it is necessary to select the correct instrument from this instrument selection menu.

10.2.4 Konelab language selection

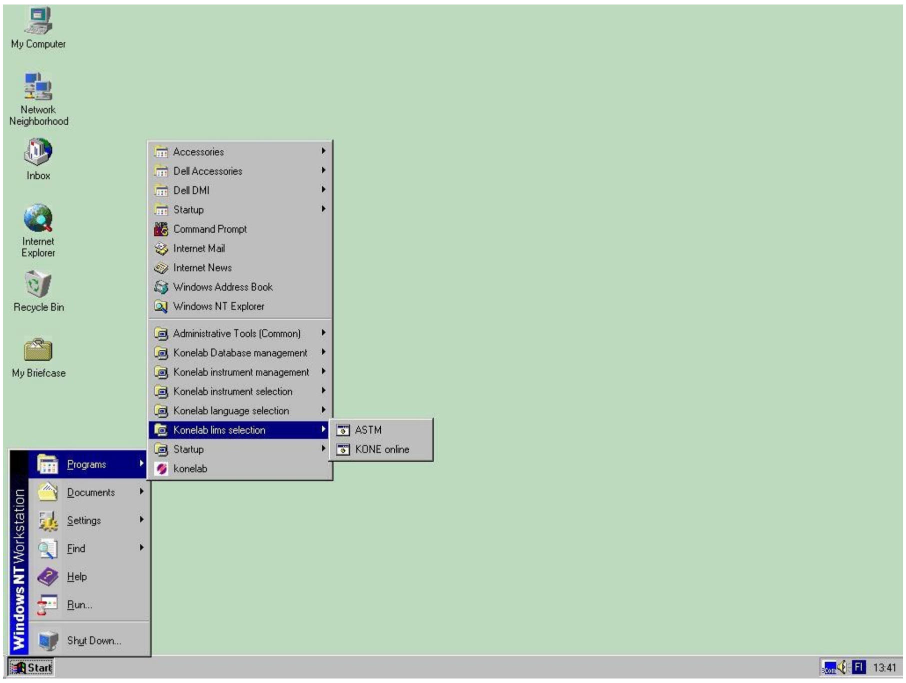


Select the language which the Konelab program is using from the Konelab language selection menu. Do not change the language if the Konelab program is running.

Keyboard, Date/ Time, Regional settings etc. are changed from Start: Settings: Control panel.

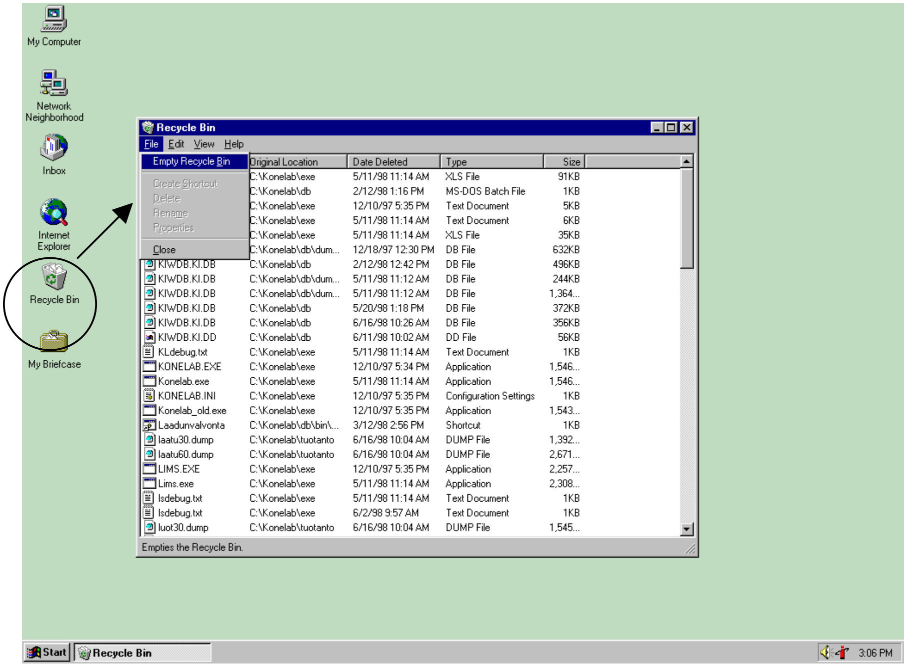


10.2.5 Konelab LIMS selection



Select the LIMS protocol from the Konelab lims selection menu.

10.3 RECYCLE BIN



☞ All deleted items are gathered to the Recycle Bin. To clean the Recycle Bin double-click the icon, then select File: Empty Recycle Bin. Confirm the selection and close the window.

10.4 VOLUME ADJUSTMENT

To adjust the volume, click the volume icon in the right corner of the window. Activate the volume button by moving the cursor above the button and pressing the mouse's left button down. Move the mouse to adjust the volume. If you want the volume off, click to the square 'Mute'. Close the adjustment by clicking elsewhere in the window.